The Journal of Obstetrics and Gynæcology of the British Empire

VOL. XXIII. FEBRUARY, 1913. No. 2.

Burton ("Dr. Slop"): His Forceps and His Foes.

By ALBAN DORAN, F.R.C.S.

PART II.

FOUNDATION OF THE YORK COUNTY HOSPITAL AND PERSECUTION OF DR. BURTON.

IN the first part of this memoir, Burton's two forceps were described and his purely professional writings reviewed, with references to allusions in the pages of Sterne's novel. This part will treat of his public work, of his political labours and consequent persecution, and of Burton as an antiquary, and will end with a consideration of the doings and sayings of Dr. Slop as chronicled in *Tristram Shandy*.

The history of the foundation of the York Hospital and the political entanglements of the learned doctor is presented to us in detail in his *British Liberty Endangered*. Of this work, the College of Surgeons possesses a copy, purchased at the sale of Dr. Merriman's library. The title page, here reproduced, is missing in the College copy:—

> *BRITISH LIBERTY ENDANGERED*, a Narrative, wherein it is proved that John Burton has been a better friend to the English Constitution in Church and State than his Persecutors. 1749. "This personal narrative of Dr. John Burton, the author of the *Monasticon Eboracense*, is excessively rare and gave rise to the quarrel between him and Sterne, for which the latter immortalised Burton as Dr. Slop in his *Tristram Shandy*." (Extract from Thorpe's Catalogue, *Bibliotheca Britannica*, 1839, pasted in the College copy.)

British Liberty is dedicated "To the Right Reverend Father in God Thomas, Lord Archbishop of Canterbury."[1] "Your Grace will pardon the Freedom I take, in dedicating the following Sheets to you, being the most proper Person I could have addressed 'em to." The pamphlet is a relation of what happened to Dr. Burton from the

1. Thomas Herring, translated from York in 1747.

York County Election in 1734 till the end of the "'forty-five." The narrative is worth relating.

When in practice near Wakefield in 1734 Burton actively canvassed for the Tory member during the election for the County of York, and "did signal Service by attending at one of the Booths, and preventing several from being poll'd in an unfair manner." His candidate, the Tory, Sir Miles Stapylton,[1] obtained a majority over Sir Rowland Wynne, the Whig, whom Dr. Jaques Sterne was supporting. Nephew Laurence actively assisted Dr. Sterne in his parliamentary work, yet it appears that no writings of Laurence Sterne in connection with these contested elections are preserved.

Burton found out very soon after the election that Tory voters and tenants were subjected to all kinds of annoyance. Summons and litigation ensued, and when at length somebody paid the expenses of Sir Miles' friends "all Actions ceased."

In January 1734-5, Burton married a Miss Hewson, who had small private means. Then he went abroad and studied under Boerhaave. On his return he set up in practice in York and soon became engaged in a great philanthropic work.

Before reporting Dr. Burton's own history of his public work and his persecution, I will turn the reader's attention to an independent account of the foundation of the York Hospital published by Mr. Robert Davies in an article on Dr. Burton in the *Yorkshire Archæological and Topographical Journal* for 1871-2. Mr. Gayner and Mr. Neden have kindly committed this important quotation to my notice:—

> According to the usage of that period, Dr. Burton combined the practice of accoucheur with that of the higher branch of his profession. To use his own words he followed the profession as a physician and man mid-wife. From the time of his first settling at York he set apart a certain time every day to give his advice to all who went to ask it; and those who were so bad that they could not with safety venture out, he went to visit at their own houses. Hence he daily saw the misery that the poorer sort of people underwent, and that numbers frequently died, not only for want of advice and medicines, but also for want of common necessaries. He therefore projected the building of an Infirmary for the city and county of York, and published proposals for raising a subscription for that purpose. A year and a half passed without much being done towards accomplishing that object. At length a public meeting was called at the instance of Geo. Fox, Esq., one of the representatives of the City in Parliament, and a liberal

1. The name is so spelt in Burton's narrative and in the List of Subscribers in his *Monasticon*.

subscription was entered into, chiefly by the Tory party. According to Burton's account of it, none of the Whigs or Ministerialists were present at the meeting.

In 1740 the building of the Hospital was commenced. In due time it was completed and Dr. Burton and Dr. Barnard were appointed to be the first honorary physicians. Mr. Francis Drake, whose celebrated History of York had been recently published, was one of the first honorary surgeons.

We will now consider Dr. Burton's version of his share in this good work. He speaks for himself in *British Liberty Endangered*, p. 15. "When I came to York, I daily saw the Misery, that the poorer Sort of People underwent, and that numbers frequently died not only for want of Advice and Medicines, but also for want of common Necessaries; I therefore projected the building an Infirmary, for the City and County of *York*, and published Proposals in order to raise a Subscription for that Purpose. Not much was done towards forwarding this good Work, for a Year and a Half and though most People wished for an Hospital for Sick and lame Poor, yet none would undertake to begin a Subscription till *George Fox*, Esq., a worthy Representative in Parliament for the City of *York* published also Proposals and advertised a Meeting to which all well-disposed Persons were invited." No Whig, it appears was present at the Meeting and many opposed the project more particularly 'a Clergyman then in a high Station in the Cathedral of *York* who hearing that Lady *Elizabeth Hastings* intended to give 500*l* towards erecting the Infirmary wrote to her to prevent it.' Her Ladyship showed this *Sterne* epistle, as we may correctly call it, to another Cathedral dignitary, more favourable to the project, and at last 'all things succeeded.'"

Mr. Wallace Hargrove informs us in his *York County Hospital, its Origin and History*,[1] that Lady E. Hastings, it was found, bequeathed £500, dying in December 1739. According to the Hospital Trust Deed, dated February 1742, Richard Harland of Sutton in Galtres made over an acre of ground to the Hospital. Among the trustees are Philip Harland, the "Oxmoor Squire" of *Tristram Shandy*,[2] incorporated with Shandy senior in the novel. There are also a Perrott and a Wentworth, other members of whose families appear in the list of subscribers to the *Monasticon*.

Burton, continuing his narrative, explains how he visited the hospital daily, and called on poor patients at their own homes when they were too ill to be moved. "This, together with some other Acts of Humanity gained me some Esteem." In other words his philanthropic services were utilized for fresh electioneering purposes. When the next election came on in 1741 (Wilbur Cross, *loc.*

1. Reprinted from the *Yorkshire Herald*, July 8 and 15 1905.
2. Bk. IV, Chap. XXXI, and Wilbur Cross, *loc. cit.* pp. 64, 244.

cit., p. 76, *British Liberty* here gives no dates) the excitement and recriminations grew worse than before. Several pages are devoted to the exposure of Whig villainy. He rather humorously speaks of them as " these *Pretenders* to support *Liberty*," and two pages later on, he taunts the Whigs with " promoting Jacobitism " by maltreatment and persecution. We may assume that he was a Tory who was loyal to King George and did not talk about " Hanover rats " like Squire Western in *Tom Jones*. Burton lived in Coney Street at this time and applied to the Corporation for a more suitable residence. His political enemies tried, unsuccessfully, to prevent the lease, but a few years later came their chance to ruin if not to slay him.

A better known " Pretender to support liberty " landed in Scotland. On November 22 1745, an express arrived at York announcing that the Highland army was at Kendal. Burton feared for his estates, Birkwith and South-House in the Lordship of Nuby, where his rents were due. The conduct of Place, the Recorder of York, was very suspicious in association with what followed. Burton asked the Recorder's advice, and that powerful functionary reminded him that if he went he might be taken prisoner and then he would blame those who had advised him. Burton replied that he would never blame those who gave advice with a good intent whatever happened. " *I would only ask him, what he would do, was* (*sic*) *he in my Situation*? He replied, *he would post away and be there before 'em. Well then*, said I, *I'll start to-Morrow Morning for that Purpose;* and so we parted." Burton took further precautions, and the Lord Mayor gave him permission to go out of the city gates at what hour he pleased next morning. Burton left York on November 23 and reached Settle after 9 p.m., where he learned that the Highlanders had taken the road towards Lancaster. He sent letters to the Recorder and to Mrs. Burton announcing the news and stating that he hoped to be back within a day or two. He started in the morning for Hornby, but was taken prisoner, when he was being shaved, by some Highlanders who were escorting Lord Elcho. " I then returned to *Settle* that Night, where my Tenants and Workmen were waiting for me according to Order at my Inn." Then he paid them off and left Settle next morning, and he notes that no authority or functionary touched him there. He reached York at 9 p.m. Here we may note that he says not a word about parole, nor about being set free, nor according to his statements could the Highlanders have taken him to Lancaster. But, anyhow, Burton was betrayed. Was he a clever plotter after all? Dr. Ferriar [1] is

1. John Ferriar, M.D. Edin. (1761—1815), was a physician who practised in Manchester. His *Illustrations of Sterne*, literary not pictorial, first appeared in 1798. The quotations in this article are from the second edition

inclined to side with the Whig view of the charge against him, but perhaps Ferriar was a Whig, or an enemy of the papists.

Burton maintains that he knew who betrayed him. "On my being seen (although a Prisoner) with the *Highlanders*, a Quaker, one *B-rb-k* of *Settle*," sent the news express to York, to the dismay of Burton's friends and the joy of his enemies. Mrs. Burton knew that he carried pistols [1] and had often declared that he would shoot the first man who would attack him. She now believed that the Guards would possibly arrest him at Mickelgate Bar, and after duly taking advice she sent a person to meet him and desire that in the case of such an attempt he would not offer to make any resistance.

Just as the net was closing around him, poor Burton had professional dealings with the warning messenger:

"She [Mrs. Burton] sent one *Robinson*, who met me at the South End of *Dring-houses*, and told me what my Wife requested of me; I made him no other Return, than to enquire how his Wife did, who (at that Time was my Patient) he told me, that he should be glad if I would go that Night to see her. I begg'd to be excus'd as it was so late, and as I was so tir'd unless her Situation requir'd it, and that I desir'd he would come and send to my House, and I would prescribe for her, since he had told me how her Disorder had alter'd after I had seen her; he then reply'd that as it would be so much out of his way, he would be oblig'd to me, to call at any public House and give him Directions; I call'd, prescrib'd, and then went on to my own House. The Prescription, he that Night gave to his Servant to carry to the Apothecary, who kept it upon the Files as usual. The Patient after this Prescription recover'd. This was afterwards mention'd as an aggravating Circumstance, or rather as they would have it a Proof that I must have been on treasonable Business, for right or wrong it must be a Plot, because there was a Papist concern'd, or because they knew not what to make of it."

Longa est Injuria, longae Ambages, as Burton says in this pamphlet. Latin quotations were ever soothing to the Eighteenth-century soul in affliction, but the full record of what ensued would be very wearying to the reader. The Doctor was not arrested at the Gate, Mrs. Burton told him of the Quaker's treacherous information,

1. "Thou hast come forth unarmed; thou hast left thy *tire-tête*, thy newly-invented *forceps* . . . behind thee: by Heaven! at this moment they are hanging up in a green baize bag between thy *two pistols* at the bed's head." *Tristram Shandy*, Bk. II, Chap. XI.

(1812). There is some mystery about Burton's own itinerary. He went to Hornby (*British Liberty*, p. 27) which is in Lancashire, between Settle and Lancaster, not to be confounded with the Hornby near Richmond, thirty miles north-east of Settle. Yet further on (p. 40) he speaks of "My Return to *York* from *Lancaster*." Perhaps he meant *Lancashire*.

and Dr. Burton at once reported his arrival to the Recorder, who sent for him. "Notwithstanding I was so wearied, I went, and over a Bottle of Wine told him every Thing that had befell me." Then came some parleying with the Archbishop [1] next morning, November 28 1745, and certain legal precautions were taken. A "priest," [2] as Burton calls him, put in an appearance and made out that, according to a letter received from a friend, Burton had invited the rebels to come to York. The Recorder behaved oddly, Burton openly faced his accusers in the Guildhall where he was walking and talking with several magistrates, but they insisted on his commitment.

"But before they durst commit me, the R-c-rd-r sent for all the Party that could be met with in the Streets, Coffee-Houses, etc., to attend the Hall, though 'tis very well known, they had no Business there, either as Evidences or Magistrates. One of the Priests made a great Blustering, and talked much, but it was *vox et praeterea nihil*; he was often in such a Hurry with Party Fury, that he could not utter his Words for *vox faucibus haesit*, and he perfectly foamed at the Mouth, especially when I laughed at him and told him, that I set him and all his Party at Defiance unless false Witness were to appear, which I own, I was not altogether without apprehensions about."

"About two o'clock that Afternoon, I was committed to *York* Castle, and a Copy of the Commitment is as follows:—

"West Riding of the County of *York*: To the Keeper of his Majesty's Goal (*sic*), the Castle of *York*.

Whereas by the Examination of John *Burton of the City of* York, *Physician, taken before us, Two of his Majesty's Justices of the Peace for the said County and Riding, the 30th Day of* November 1745. *It appears, that on* Sunday *last, he was at* Hornby *Castle in Company with some of the Rebels, and from thence was carry'd, as the said Examinant confesses by them,* Prisoner *to* Lancaster, *where he was permitted to go at large* as such, *upon his Parole of Honour, and continued there as* such *'till* Tuesday *Morning, at which Time he was dismiss'd with a Pass for his Safety, signed* J. Murray. *From all which above Premisses and other Circumstances, it appears to us that the said* John Burton *is a suspicious Person to his Majesty's Government.*

These are therefore to require and command you, that you receive and safely detain the said John Burton *in yuor* (*sic*) *Custody, upon the Premisses abovesaid, untill he shall be duly discharg'd by Law. Given under our Hands and Seals this 30th of* November 1745.

T. Place.
J. Sterne."

1. "Our then Archbishop Dr. *Thomas Herring*" (1743—1747), translated to Canterbury, 1747, died 1757.

2. This "priest," as Wilbur Cross explains (*loc. cit.*, p. 77), was Dr. Jaques Sterne himself.

The conduct of Place, the Recorder, with whom Burton was so candid, "over a bottle of wine" seems strange.

Burton being in durance "Dr. *S——n*" published a paragraph in one of the local newspapers on Dec. 3rd, and it was re-printed in the *London Evening Post*. It grossly prejudged the case, and stated that on his own confession Burton had conversed at Lancaster "with Lord *George Murray* and a Person call'd his *Royal Highness Prince Charles*. There was the greatest Satisfaction express'd at his Commitment from the highest to the lowest Person in the City, that has been known here upon any occasion." [1]

The last sentence is a deliberate "terminological inexactitude." There was deep sympathy with Burton, who declares that Sterne's printer advised the omission of this lying statement, "but *S——n* order'd him to print it as *he had wrote it*."

Then matters took a worse turn. A fellow prisoner, James Nesbit, gave false information about Burton having drunk a treasonable toast in gaol. The unhappy physician had given notice that he would be prepared with sufficient bail, but on the declaration of the informer Nesbit before the Lord Chief Justice the following Warrant of Detainer was signed:—

"Castle of *York*, Dec. 14 1745. To the Keeper of his Majesty's Goal (*sic*) or Castle of *York*, or his Deputy.

You are hereby required and commanded to keep the Body of John Burton, *Physician, already in your Custody; in safe Custody, and not suffer him to be discharged; in order to answer a farther Charge made against him upon the Oath of* James Nesbit *taken before us this 14th Day of* December, *and this shall be your Authority for so doing. Given under our Hands and Seals, this 14 Day of* December 1745.

Jaques Sterne.
Mar. Braithwaite.
Rt. Oates.
Jos. Stillington."

Surely Laurence Sterne must have chaffed Uncle Jaques about his reverend name appearing with an Oates, in the matter of a Papist charged with treason!

Dr. Sterne and Place the Recorder believed in Nesbit's evidence, and then signed the following Warrant of Detainer:—

1. When, in 1745, a defence fund was raised in York at the outbreak of the Jacobite rebellion, Laurence subscribed £10 and his uncle £50, and soon afterwards Laurence wrote for *Lloyd's Evening Post* a congratulatory letter on the arrest of Dr. Burton (Sir S. Lee, *Dict. Nat. Biog.*). For the part Dr. Sterne played in the direct attack on Burton and Drake, see Wilbur Cross, *loc. cit.*, pp. 74-5.

" To the Keeper of his Majesty's Goal (*sic*), or Castle of *York*, or his lawful Deputy.

Let the Justices of the Peace for the County of York *take Care, that Dr.* Burton *be not admitted to Bail: The Information of* James Nesbit *taken on Oath before us, amounting* (*as we think*) *to High Treason.*

Jaques Sterne.
Mar. Braithwaite.
Jos. Stillington.
Robt. Oates."

However, Burton's friends saved him. Just before the Assizes the Secretary of State intervened with an order that the prisoner be conveyed up to London for examination before the Privy Council. Mr. William Dick, Burton's friend, accompanied him to London on March 12 1745–6. It is quite clear from the minutes of the York County Hospital [1] that Dr. Burton wrote to the Board resigning his post on the Hospital staff, his letter being dated on the same day that he was taken to London. It is significant that in that same year 1746 Jaques Sterne applied for the Freedom of the City of York, offering £200, but was refused. In May Burton was examined at the Cockpit, in September he was allowed to go out and at last, on March 25 1747 he was discharged on bail, to appear at York Assizes in July. But as the Act of Grace was passed at the conclusion of the parliamentary session, Burton, although he had been so much persecuted, was not prosecuted after all.

Soon after " the '45 " Laurence Sterne contributed to a new Whig newspaper published in York, but a little later he suddenly informed his uncle that he would write for the Whigs no more, and a very vulgar quarrel between these worthy clergymen and kinsmen occurred in 1747. The grasping pluralist uncle wanted more sinecures, but was disappointed of immediate reward.[2] He had grown unpopular, not solely on account of his persecution of Burton, but also for his behaviour to another member of the staff of the York Hospital, Francis Drake, the first honorary surgeon, an antiquary like his colleague; Dr. Sterne likewise made enemies about his attitude to a " Popish nunnery." [3] Drake, to whom we shall return, was born at Pontefract in 1696; he was a staunch Jacobite and persistently refused to take the oaths to government. During " the '45 " he was called upon to enter into recognizances to keep the peace and not

1. For this important piece of evidence I am indebted to Mr. Frederick Neden, Secretary and Manager, York County Hospital. Wilbur Cross is therefore incorrect when he states that " Dr. Burton lost his place on the hospital Board " (*loc. cit.*, p. 78).
2. Wilbur Cross, *loc. cit.*, p. 83.
3. Wilbur Cross, *loc. cit.*, p. 83.

to travel five miles from home without a license. He was superseded in the office of City Surgeon, which he had held since 1727 at a meeting summoned by the Corporation on December 20 1745, and it was not until July 1746 that he obtained a discharge.[1] There were more domestic troubles in the Sterne family shortly afterwards. Laurence's mother was an objectionable woman, who, with his younger sister, got a great deal of money out of him, but, even according to his own account, his conduct was not filial, and Uncle Jacques held him up to scorn on that account. The old woman was, it is said, a prisoner in "the common goal at York" for a time before her decease in 1759.[2] The son did not show much regret for her, and when the place-hunting uncle died a month later and Laurence found that he had been left out in the will "he did not putt on Mourning tho' he had it ready."

When Burton lay under arrest in London he spent his time in better ways than in sordid quarrels with relatives. He conversed with some Jacobite prisoners, and published what he learned from them in *A Genuine and True Journal of the Most Miraculous Escape of the Young Chevalier*, a book published in 1749. By that time too, according to Wilbur Cross (*loc. cit.*, p. 78) he had begun, under the influence of Drake, his systematic archæological studies. They resulted in the *Monasticon*, which was issued a year before his pamphlet on the Young Pretender. Burton's practice returned to him on his release, so that he was clearly esteemed at York. A few years later the famous *Essay and Letter* were published. It will be seen that he had pecuniary troubles before 1756. The precise date I cannot find, but it is very probable that his imprisonment was the cause of these difficulties.

In the autumn of 1754, when Burton was dining at the house of Jubb, an apothecary who had been elected Sheriff, he remained seated when the Lord Mayor proposed the then usual toast to the memory of King William III. Mr. George Thompson, a Whig guest, filliped a cork at the physician and afterwards tried to compel him to drink everlasting disappointment (or damnation) to the Pretender and all his adherents. As John Byrom sang "God bless—no harm in blessing—the Pretender," it was hard to expect a Catholic physician to curse him. Burton declined to drink damnation to anybody. He was ejected after gallantly defending himself with his cane, "levelling to the floor two gentlemen" (Wilbur Cross, *loc. cit.*, p. 79). Thompson published *An Account of what passed between Mr. George Thompson of York and Dr. John Burton of that City, Physician and Man-midwife at Mr. Sheriff Jubb's Entertain-*

1. G. Goodwin. Art. "Drake: Francis." Sir S. Lee's *Dict. Nation. Biog.*

2. There is some uncertainty about the last days of Sterne's mother. See Wilbur Cross, *loc. cit.*, pp. 183-4.

ment, and the Consequences thereon (1756). The author sarcastically alludes to " this great patriot personage " who would redress certain illegalities whilst " he himself broke for upwards of five thousand pounds and paid ten shillings in the pound," living afterwards for awhile on his wife's fortune. Yet Thompson wished Burton success in the subscriptions he was at the time soliciting for his *Monasticon*, as it would prove useful if a Catholic ruler were to come into power and resume the Church and Abbey Lands, making the present usurpers accountable for dilapidations! (Ferriar, *Illustrations of Sterne*, 2nd Ed., vol. i, p. 141). The host, Jubb, was a subscriber, as will be seen, to Burton's *magnum opus*.

I may note that the excommunication which Dr. Slop reads in full (*Tristram Shandy*, Bk. III, Chap. xi), possibly suggested by the *Letter to Smellie*, is followed by Uncle Toby's expression of regret that the Devil was, as Dr. Slop casually observes, " damned already to all eternity," just as Burns later on grieved for the " puir Deil." [1] Sterne and Thompson seems to have looked on Burton's toleration for the Pretender as profanity pure and simple.

The Obstetrician as an Antiquary.

Laurence Sterne knew well enough that Burton was a great antiquary, and no mere amateur. Our readers, I trust, will be gratified to learn what a scholar this man was, who earned his bread by medicine and obstetrics. Among his antiquarian works there remains a masterpiece. It appeared nearly two years before *Tristram Shandy*, and in that work Sterne makes a cruel reference to Burton as an antiquary. As Trim reads out Yorick's sermon on Conscience, Slop favours the company with comments. Misunderstanding one of his remarks, Uncle Toby asks him if the Inquisition is an ancient building or a modern one. " 'I know nothing of architecture,' replied Dr. Slop." [2] Sterne describes Dr. Slop as " fully as hobby-horsical " as Uncle Toby himself, and the hobby is obstetrics. Probably this sentence about architecture was written expressly to tease Dr. Burton who would have preferred antiquities to " shop," as the particular hobby ascribed to himself in *Tristram Shandy*.

In the preface to his *Monasticon*, Dr. Burton states that:

> " From the time I went to St. John's College at Cambridge, I had a kind of natural curiosity to penetrate into the darkest and most remote state of my country in general, which increased upon me as I proceeded; and I may say, became so established, upon my travelling in foreign countries, that at my return home, and

1. *Address to the Deil*, final verse.
2. *Loc. cit.*, Bk. II, Ch. xvii.
3. *Ib.*, Bk. III, Ch. xiii.

making my abode in it, to follow my profession as physician and man-midwife, I spared neither labour nor expence to pick up what materials I could; which my profession enabled me to do, by being more in gentleman's families, than, in all probability, on any other occasion I might have been; and on some accounts, being obliged to attend for some days at a place, it gave me an opportunity of making enquiries in the respective neighbourhoods. And altho' the science of physic will not enable either me, or others of my profession, to preserve the lives of my fellow creatures to an anteduluvian age, I have, at least, attempted (notwithstanding the difficulty) to preserve all that can be left of them—I mean their memories." [1]

A pleasing *Apologia*, refreshing to read after Burton's vitriolic criticism of Smellie. The manner in which he combined physic and archæology is interesting. Let it be noted that he is not ashamed to call himself a " man-midwife " in 1758. If we turn to *Tristram Shandy*, in the twelfth chapter of the second book written in 1759, where Tristram's father accuses Uncle Toby of bothering, with his fad or hobby-horse, " 'the man-midwife'—'*Accoucheur*, if you please,' quoth Dr. Slop." [2]

In the same preface Burton speaks of Dr. Nathaniel Johnston [3] of Pontefract, who in the seventeenth century collected about a hundred manuscript volumes of matters relating to Yorkshire.

In the spring of 1745, so fateful as has been explained to both of them, Burton and his colleague at the Hospital, Francis Drake, explored a district between York and the coast in order to fix the site of Delgovitia. Two years later, when both had been freed from their troubles, namely, on May 28 1747, Burton read, before the Royal Society, a paper which is published in the forty-fourth volume of the *Philosophical Transactions*, pp. 541 to 552, and is headed *A Dissertation of the Situation of the Ancient* Roman *Station of* Delgovitia *in* Yorkshire *by* John Burton *of* York, M.D. This communication is followed (p. 553) by *An* Appendix *to the foregoing Paper*, by Mr. Fr. Drake. I have inspected the paper in a copy

1. In the *Monasticon* (1758), as in Smellie's *Treatise* (1779, edition in Library R.C.S.), the initials of common nouns are no longer printed in capitals.

2. *Accoucheur* as meaning an obstetrician, came into vogue in France in the seventeenth century. *Accoucher* in old French simply meant " to take to one's bed." " Le jour de Noël, environ minuit, *accoucha* au lit malade le roy Charles " (*i.e.*, Charles le Bel). *Chroniques de St. Denis.*

3. B. 1627, d. 1705, M.D. King's College, Cambridge, in 1656, and Fellow of the College of Physicians 1687. He practised for a time at Pontefract, but, unlike Burton, allowed his antiquarian and other studies to ruin his practice. He went to London, took, like Burton, to Tory politics, and was ruined by the accession of William III. A son and a grandson of Johnston's were members of our profession. See Norman Moore, Article " Johnston, Nathaniel." Sir S. Lee's *Dict. Nation. Biog.*

of the *Transactions* belonging to the library of the College of Surgeons. There are two fairly drawn plates, inferior to the illustration of the forceps in Burton's *System* reproduced in the first part of the article, but superior to the remaining plates in that work. They bear no artists' names. Drake states that Burton had all the Roman "works" measured and planned at his own expense; Burton fixed the situation of Delgovitia at Millington between Bridlington and York.

In 1754 Burton and Drake [1] explored the so-called "Danes' hills" on Skipworth Common. Drake took great interest in the *Monasticon*. We will now turn to Dr. Burton's archæological masterpiece.

The Monasticon Eboracense.

Burton's *Magnum Opus* is a very rare work. The library of the Athenæum Club possesses a copy in perfect condition with the title-page and a frontispiece, a plan of Fountains Abbey, alike free from blemish. It was presented to the library by Mr. Edward Hailstone, F.S.A.[2] in 1883. The two fine plans, one of Fountains and other of Kirkstall Abbey, are marked *Thos. Atkinson, Ebor. Delint*„ to the former "*Fras. Perry, Sculp.*," is added, and *R. Ledger, Sculp.* follows Atkinson's name at the foot of the second plan. A map of Hemingborough is included; it is simply a surveyor's plan. The drawing of Burton's forceps reproduced in the first part of this article bears no engraver's name, but though in no sense an expert, I cannot help thinking that it was probably executed by the same engraver, Atkinson, who drew the plans of the two abbeys.[3]

The title-page, as in many similar works, includes what is practically a table of contents, so that it is here reproduced:—

MONASTICON EBORACENSE AND THE *ECCLESIASTICAL HISTORY* OF *YORKSHIRE* CONTAINING An Account of the first Introduction and Progress of CHRISTIANITY in that Diocese, until the End of *WILLIAM* the Conqueror's Reign. ALSO The Description of the Situation, Fabric, Times of Endowments of all CHURCHES, Collegiate„ Conventual, Parochial, or of peculiar

1. Drake's *Eboracum*, once a standard work on York, had already appeared, in 1736. In later years he compiled a *Parliamentary History* in several volumes. He was an F.R.S. and for a time an F.S.A. He died in retirement at Pontefract in 1771 (Gordon Goodwin, *loc. cit.*).

2. Edward Hailstone, F.S.A. (1818—1890), of Walton Hill, Wakefield. His great collection of works relating to Yorkshire were for the greater part bequeathed to the library of the Dean and Chapter, York. He was the author of *Portraits of Yorkshire Worthies* (1869). H. R. Tedder, Sir Sidney Lee's *Dict. Nation. Biog.*

3. Wilbur Cross (*loc. cit.*, p. 140) writes: "Burton's books, now of great rarity, were worth owning, even in Sterne's day, for their copperplates etched by George Stubbs, the horse-painter." This name does not appear in the plates in the *Monasticon*. No doubt the forceps is very well etched.

Jurisdiction; and of other Religious Places in that District, and to whose Memory they were dedicated. Together with An Account of such Monuments and Inscriptions as are worthy of Notice, as well as of the Rise, Progress, Establishment, Privileges, and Suppression of each Order, Religious or Military, fixed therein, With the Catalogues of all the Abbots, and other Superiors of those Places, and of all the Patrons, Rectors, Vicars, Cantarists, &c., of each Church, Chapel, &c., from the earliest Account down to the present Time. Collected from the best Historians and antient Manuscripts in the *Bodleyan*, *Cottonian*, and other Libraries in *London*, *Oxford*, *Cambridge*, and several Cathedrals; as also from other public Records, Registers and Chartularies in the *Tower* and other Offices in *London*, and in the Archiepiscopal, Episcopal, and Deans and Chapters Offices in the Cathedrals of *York*, *Durham* and *Chester*, and in private Hands and from Parochial Registers. With above *Two Thousand Copies of Original Charters and Deeds never yet published.* Adorned with Copper-Plates, representing the Ichnographies of some of their Churches, Abbies, Ruins, &c., and other curious Things worthy of Observation. To which is added, A Scheme and Proposals, in order to form a Society for compiling a complete Civil and Natural History of the Antient and Present State of Yorkshire. With a Chorographical & Topographical Description thereof; and for a Set of accurate Maps, taken from actual Surveys. To this is subjoined a short Historical Account of the Parish of *Hemingbrough*, as a Specimen; showing what Materials the Author has collected toward assisting such a Society, according to the above Proposals. By John Burton, M.D. York. Printed for the Author by N. Nickson, in *Coffee-Yard*, M.DCC,LVIII.

One hundred and twenty names appear under the List of Subscribers, including five Doctors of Medicine, namely, Dr. W. Cowper of Chester, Dr. Robert Dolman Junr. of Pocklington, Dr. Christopher Hodgson of Wakefield, Dr. W. Richardson of Ripon, and Dr. W. Roundel of York. There is at least one surgeon, Burton's friend, "Mr. Francis Drake, fellow of the Royal and Antiquarian Societies," and one apothecary, Henry Jubb, the host at the dinner in 1756 where Burton was ejected. The list is headed by Hay Drummond, then Bishop of St. Asaph, translated to York three years later. Philip Harland [1] and Sir Brian Stapylton are in evidence, as are the

1. The Squire of Sutton, one of Sterne's vicarages. He contributed liberally to the county hospital at York, of which he was one of the founders (*vide supra*). Being a Tory, Sterne as a Whig disliked him. Philip Harland's experiments in farming were ridiculed in Mr. Shandy's troubles with the Ox-moor. Harland must not be confounded with Stephen Croft, Squire of Stillington, Sterne's other vicarage, who saved the manuscript of the first part of *Tristram Shandy* from the flames (see Percy Fitzgerald and Wilbur Cross, *loc. cit.*, *passim*).

Duke of Norfolk and the Earl of Northumberland. We find, without the least surprise, that the name of Sterne is conspicuous by its absence. The work is dedicated to Lord Willoughby of Parham, President of the Antiquarian Society, to Richard Frank, Recorder of Pontefract and Doncaster,[1] and to the rest of the members of the Antiquarian Society.

As the title-page indicates, the treatise, a big folio of 448 pages of text and also a good index of places and another index of names, is very exhaustive. The historical summary at the beginning is excellent. Dr. Burton in reference to the famous disputes between the British and Roman Churches, makes himself out no bigot. "Was (*sic*) it not for the daily experience we have of the force of custom in common life, it would not be easy to conceive how well-meaning and pious men should fall into heats, scarce compatible with Christian charity, in disputing, whether the hair of Ecclesiastics should be clipped on the top of the crown in the form of a circle, or only in the fore-part of the head from ear to ear, something like a semi-circle, which last is thought to be the British fashion." [2] Unfortunately Dr. Burton "fell into heats" himself rather frequently. In the case of Dr. Sterne who tried to hang him, he had every excuse, but his too well-known *Letter* to Smellie was much too fiery. The great Scotchman proved to be in the right about forceps, and Burton made too much of the *Lithopaedus* blunder. Yet posterity has justified his "falling into heats" about teachers who recommend tugging at the placenta.

This splendid antiquarian monograph does not contain much matter of direct interest to us. "By hospitals" the Author reminds us, "in the following work, I mean houses for the relief of poor and impotent people; in which generally were two or three religious, one to be Master or Prior, and one or two to be Chaplains or Confessors, and these observed the rule of St. Austin." [3]

The second volume of the *Monasticon* never appeared, a few pages are preserved in the King's Library, British Museum, with the first volume. Burton also wrote two tracts on Yorkshire Antiquities in the *Archaeologia*, 1768 and 1771.[4]

TRISTRAM SHANDY.

"Who has a breast so pure,
But some uncleanly apprehensions
Keep leets and law-days and in session sit
With meditations lawful?"

Shakespeare, *Othello*, Act III, Sc. 3.

1. It was Frank who allowed Burton access to Nathaniel Johnstone's antiquarian manuscript (Norman Moore, *loc. cit.*).

2. *Monasticon*, p. 11.

3. *Loc. cit.*, p. 63.

4. See Rev. C. J. Robinson, "Burton, John, M.D." Sir Sidney Lee's *Dict. Nation. Biog.*, 2nd ed., for details about the disposal of the MS. of *Monasticon*.

There is, it cannot be denied, much matter in *Tristram Shandy* repugnant to twentieth century taste, and its author was unpardonably gross and spiteful in many of his references to men with whom he disagreed. Still, the novel is a masterpiece and posterity has forgiven Sterne for all his shortcomings for the sake of Uncle Toby. It is unfortunate that the great novelist hardly strived to live up to the level of that lovable character whom he created. Uncle Toby would not kill a fly. Sterne held up to ridicule and contempt Dr. Burton, the man whom Uncle Jaques tried to hang, very possibly with the secret aid of Laurence himself.

The long-winded discussions of obstetrical questions in *Tristram Shandy* were not offensive in the relatively aristocratic era when the novel appeared. Percy Fitzgerald points out that according to allusions in newspapers of those days young ladies carried this plain-speaking work in their pockets. The truth is that midwifery was not an indelicate subject if associated with the begetting and bringing into the world of an heir apparent,[1] a lord or, in this case, "A Shandy." Dr. Allport considers that Sterne knew where to draw the line, yet it seems odd that the novelist who turned light on the conjugal couch in his first chapter, kept his readers out of the lying-in chamber further on. Voltaire wrote in the same sense on the philosophy of paternity in *L'homme aux Quarante Ecus*,[2] a novel, by the way, published seven years after the issue of Sterne's work. The first part of *Tristram Shandy* appeared in January 1760. Johnson's *Rasselas*[3] and Voltaire's *Candide*[4] were published entire in 1759, and *L'homme aux Quarante Ecus* came out in 1767.

1. "Sa Majesté devint grosse; le roi en fut ravi." Madame Campan, *Mémoires sur la Vie Privée de Marie Antoinette*, Vol. I, Chap. viii. This was the usual plain way of speaking of the prospect of a Dauphin. British letter-writers used even plainer language about royal and noble pregnancies.

2. Voltaire expressed his admiration of *Tristram Shandy* in his article "Conscience" (*Dictionnaire Philosophique*), and in a review of a French translation preserved in his *Mélanges littéraires*, written in 1777 within a year of his death.

3. In October 1759 Sterne wrote to Dodsley, the London publisher: "I propose . . . to print a lean edition [of *Tristram Shandy*], in two small volumes, of the size of *Rasselas*." (Wilbur Cross, *loc. cit.*, p. 181. For the latest information about the precise date of publication of *Tristram Shandy*, Bk. I, see *ibid.*, Chap. viii. The "York 1759 edition is a myth.")

4. There is a direct allusion to Candide and la belle Cunégonde in *Tristram Shandy*, Bk. I, Chap. ix. Of the three great writers, Voltaire the vindicator of Calas, Sirven and De la Barre, appreciated doctors the most: "Est-il rien de plus estimable au monde qu'un médecin qui, ayant dans sa jeunesse étudié la nature, connu les ressorts du corps humain, les maux qui le tourmentent, les remèdes qui peuvent le soulager, exerce son art en s'en défiant, soigne également les pauvres et les riches, ne reçoit d'honoraires qu'à regret et emploie ces honoraires à secourir l'indigent?" (*Dict. Philosophique*. Article "Médecins.")

Tristram is supposed to have been born in 1718, hence "Dr. Slop" is an anachronism, for Burton was only eight years of age, and Palfyn did not make public his *mains de fer* till two years later. The address on pre-natal baptism (*Tristram Shandy*, Bk. I, Chap. xx) was (really) addressed to the Sorbonne on April 30 1733, and Chapman's *Essay* was published in the same year. Burton's *Essay* was issued in 1751, Smellie's in 1752, and Burton's *Letter to Smellie* in 1753. The reference to the Smellie ("Smelvgot") and his error about "Lithopaedus" (T. S., Bk. II, Chap. xix) proves that Sterne had at least studied the *Letter*. Whether he had any notion that the Chamberlens had made use of the forceps for many years prior to 1718 remains uncertain.

Most of our readers must be familiar with Sterne's famous work and are quite competent to pass judgment on "Yorick's" views about obstetrics. Many important critical references to Dr. Slop have appeared in recent addresses and papers by Sir John Byers, Dr. Fairbairn, Dr. W. Storey and Dr. Allport of Chicago. I also have already discussed several passages where Sterne deals with the doctor and his ways, but a more systematic abstract account of Dr. Slop's adventures at Shandy Hall will, I think, make a suitable conclusion to this communication.

Owing to certain matrimonial arrangements explained with some minuteness, it was arranged that Mrs. Shandy should lie in at her husband's country house. She would have preferred London where "the famous Dr. Manningham" would have attended her.[1] On one point she insisted; she must secure the services of an experienced midwife" notwithstanding there was a scientific operator within so near a call as eight miles of us," author, Tristram adds, of "a five shilling book." Sterne clearly disparages Burton as compared with Sir Richard Manningham, F.R.S. The latter was author of the *Artis Obstetriciae Compendium* published in 1739, and revised and issued in 1756 under the name *Aphorismata Medica*. In the interval, his *Abstract of Midwifery* (1744) appeared. Manningham is chiefly remembered for his exposure of Mary Tofts,[2] who pretended to give birth to rabbits (1726). She is represented doing so in Hogarth's well-known picture *Credulity and Superstition*. Shandy agrees to the midwife but insists on the attendance of Dr. Slop. "In a word, my mother was to have the old woman and the operator

1. *Loc. cit.*, Bk. I., Chap. xviii.

2. His pamphlet, bound up with others relating to the case of Mary Tofts is preserved in the library of the College of Surgeons, and there is another copy in the library of the Royal Society of Medicine. Boehmer, a pupil of Grégoire junior, published in 1746, a Latin translation of Manningham's *Artis Obstetriciae Compendium*, and added a description of his teacher's forceps. Like Dusée, Grégoire never published any account of his own instrument.

was to have license to drink a bottle of wine with my father and my uncle Toby Shandy in the back parlour, for which he was to be paid five guineas" (Bk. I, Chap. xviii). The midwife and her qualifications are discussed in the seventh chapter of the first book which includes an insulting reference to Dr. Mead, then deceased, and introduces us to Didius, that is to say Dr. Topham. The latter was satirized in Sterne's *Good Warm Watch Coat*, but Topham was a lawyer, not a medical man. Mrs. Nihell's *Treatise on the Art of Midwifery*, attacking Smellie and the other men-midwives, was published in 1760 after the issue of the first book of *Tristram Shandy* in January of the same year.[1]

Shandy's father was particular about Christian names, and we all know how that which he most hated was given in error to Tristram at his baptism. Chapter twenty, where that rite is discussed, contains a full quotation from Deventer of the appeal addressed to the Doctors of the Sorbonne in April 1733 by a surgeon asking for the right of baptizing an unborn child by means of a cannula "*Anglice* a squirt." *Les théologiens de France ne sont pas epargués*, Voltaire characteristically observes, in quoting this perfectly authentic appeal,[2] which is published in full in some editions of *Tristram Shandy* and is of some interest to obstetricians. In that year 1733 Dr. Burton set up in practice at Heath, Butter exhibited Dusée's forceps at Edinburgh and Chapman's *Essay* was published.

Mrs. Shandy is suddenly taken with labour pains, and Obadiah the man-servant mounts horse and goes forth to meet Dr. Slop, who happened by chance to be on his way to ask how the lady fared. Obadiah meets him, and then follows the well-known burlesque incident of the upsetting of the doctor, who enters Shandy Hall in a sad plight, stout, stunted and uncouth as Romney drew him. He is not aware that "a daughter of Lucina is put obstetrically over his head." Fitzgerald and Wilbur Cross assure us that Sterne's friends made him prune a great part of the manuscript, especially the passage on "the mischance that befel Dr. Slop,"[3] for all who saw the manuscript knew that Burton was intended. The original uncorrupted text must have been *very* hard on poor Burton. Sterne seems to have "mixed" his characters, as the *Lithopaedus* error was a triumph of Burton over Smellie and it was Burton who declined to curse at Mr. Jubb's banquet, though his letter to Smellie was highly maledictory.

Dr. Slop sends Obadiah for his instruments of which much was

1. There is no space in this article for a relation of the midwife question in Sterne's days. See Sir J. Byers, and Dr. Fairbairn, *loc. cit.* Sterne gives the reader a clear idea of the licensing of midwives in the chapter above quoted.

2. *Dictionnaire Philosophique*. Art. "Conscience."

3. Wilbur Cross, *loc. cit.*, p. 180.

said in the first part of this article, and I have also alluded to the pistols, in reference to the fateful return from Settle. In the meantime Shandy senior, Uncle Toby and the doctor chat by the fireside. The long twelfth chapter of the second book is perhaps the most typically "Shandean" passage in all Sterne's works. Uncle Toby, mounting his "hobby horse," discusses Stevinus on the art of fortifications. Mr. Shandy rebukes his brother for having his "head so full of curtains and horn-work." Dr. Slop, always placed by Sterne in an unfavourable light, makes a vulgar jest,[1] after the manner of Jaques and the Lord who killed the deer in *As You Like It*, and Uncle Toby "goes on" about Stevinus. Mr. Shandy soon loses his temper, and accuses Toby of turning off from Mrs. Shandy the attention of "the man-midwife." This irritates Slop, who makes the interpellation "*Accoucheur* if you please," and deeply wounds the feelings of the dear old uncle. (We are here reminded parenthetically by Tristram Shandy how Uncle Toby once caught a fly that kept buzzing around his nose, but let it out of the opened window instead of squashing it.) Mr. Shandy, from a glance which his injured brother casts at him, feels "sorry he spoke," and makes a fervent apology. The good uncle implores his brother to think nothing of the matter, and thanks him for perpetuating the Shandy family at his time of life. Then comes a chapter consisting of three lines. Toby says that his brother increases the Shandy family "out of *principle*," "'In a family way, I suppose,' quoth Dr. Slop." Thus Sterne after showing forth Uncle Toby in charming language disparages Burton, his enemy, by making Dr. Slop utter a vulgar joke. Taste was not, however, "Yorick's" strong point. The gallant captain turns once more to Stevinus and speaks of that great engineer's sailing chariot. Then Dr. Slop remarks that Uncle Toby need not send his lame servant Trim for the engineer's text-book as he himself knows something about the chariot, in fact he walked, when in Holland, two miles to see it in action. Uncle Toby snubs him—Dr. Slop is aways snubbed—by speaking of Peireskius who went five hundred miles to inspect the same chariot. Dr. Slop, in reply to an observation from Mr. Shandy, wonders why the gentry on the wide plain of York, "especially they whose wives are not past child-bearing," do not set up sailing chariots. Such vehicles would be expeditious for a sudden obstetrical summons and the winds cost nothing and eat nothing, unlike horses "which (the Devil take 'em) both cost and eat a great deal." Corporal Trim now comes in with

1. Possibly an allusion to a strange passage in the preface to Burton's *Treatise on the Non-Naturals*. A wise cuckold took to announcing his domestic misfortunes whenever he found himself "in company," in order to forestall ridicule. Burton declares that he, acting on the same principle, admits all his shortcomings, in his *Treatise*, in order to anticipate spiteful criticism (from Smellie, *subintelligitur*).

Toby's copy of Stevinus for reference, and on opening the book a sermon falls out. Then follows the grave humour of the reading of Yorick's sermon on Conscience where Dr. Slop makes interpellations favourable to Rome, a sermon which was approved of by the Philosopher of Ferney. On its conclusion, Dr. Slop thinks that it was about time for him to have a look at his patient, but Mr. Shandy reminds him that his services are only auxiliary to the midwife's management of the case. Dr. Slop demurs, naturally, and speaks to Uncle Toby of the recent advances made by men-midwives, the Captain, as already quoted, inconsequentially referring to armies in Flanders. I have already noted several passages in the nineteenth chapter of the second book, which is a long disquisition on Mr. Shandy's obstetrical readings, including "Smelvgot's" error about Lithopaedus, "spotted" by Burton himself. Mr. Shandy's other son was born head-foremost and proved a fool; altogether Shandy would have preferred Cæsarean section for the coming Tristram so as to avoid pressure of the child's cerebrum towards his cerebellum, and a midwife was no authority on such a question, so Mr. Shandy was in favour of a man of science who (as has been noted in my abstract of Burton's *Essay*, the "five shilling book" which Mr. Shandy had studied) was an advocate of Cæsarean section under extreme circumstances. Shandy was a prophet, and Dr. Amand Routh in this very JOURNAL has chronicled the ultimate triumph of Cæsarean section. The day of triumph was, however, far off in Shandy's time; the forceps, on the other hand, was already in fairly general use. Dr. Slop tries to open the bag, but the strings are tightly knotted and he cuts his thumb to the bone in solving the Gordian knot with a pen-knife. He curses Obadiah, and then the two Shandys make him read Ernulphus' excommunication.[1] On the possible signification of the cursing I have already dwelt. Sterne probably chronicled some real misadventures in his hints about clumsiness and cutting knots in a hurry, and his allusion to Dr. Slop's knocking out three of his best teeth with the handle of his forceps "formerly in a hard labour."[2] At last Dr. Slop is wanted upstairs for "the pains are gone" and the nurse has cut her arm and the midwife has bruised her hip. There is, of course, a squabble

1. Many years later the name of Dr. Slop, as associated with maledictions, was revived. It was bestowed, Mr. F. W. Hackwood informs us (*William Hone, His Life and Times*, p. 225), on Dr. John Stoddart, who was dismissed from the staff of the *Times* on account of the profane curses lavished on him by Napoleon. Hence Hone's once famous *Slap at Slop* (1822). Like Dr. Topham, Sterne's "Didius," Stoddart (1773—1856) was a lawyer, not an M.D. He was knighted in 1826, and wrote on philology (G. C. Boase, "Stoddart: Sir John," Sir Sidney Lee's *Dict. Nation. Biog.*).

2. *Tristram Shandy*, Bk. III, Chap. x.

about etiquette in respect to Dr. Slop and the midwife, and Uncle Toby talks of subordination and the evils of a mutiny in 1710. Dr. Slop, fully as "hobby-horsical" as the Captain, declares that all the womankind of the house are in a mutiny.[1] Some obscure allusions follow, and Dr. Slop, it is implied, tries his "newly invented forceps" on Uncle Toby's fist, tearing the skin and squashing his knuckles. The danger of applying the blade to the child's breech is next discussed. I repeat that the forceps of Burton's *Essay* which I have figured (Pt. I, Figs. 1 to 5), not the instrument now in the York Museum (Figs. 8, 9), may really have inflicted injuries on some occasions and that therefore we may assume that Burton wisely rejected it for the latter which was more serviceable.

Dr. Slop damages Tristram's nose with the blades of the forceps and goes down to the kitchen to "make a false bridge with a piece of cotton and a thin piece of whalebone out of Susannah's stays, to raise it up." Uncle Toby, of course, misunderstands the rumours which he hears about making a bridge, and at once takes to a little military engineering with Trim out in the garden. Old Shandy is disconsolate, for he lays great stress on noses and he dreads yet more that the network of Tristram's intellectual web may through uterine action have been "rent and torn to a thousand tatters" by "a pressure of 470 pounds of avoirdupois weight acting perpendicularly" on the apex of Tristram's undelivered head.[2] This brings us back to the observations at the beginning of the first part of this article. Mr. Shandy did not, like Gloucester, think that spontaneous birth feet forward hastened delivery. He greatly dreaded pressure on the brain, and believed that turning would have minimized it, but if only Cæsarean section could have been managed then, he fancied, Tristram's cerebrum, cerebellum, and nose would have entered the world unscathed!

Dr. Slop's obstetrical services are now at an end. He is consulted, however, later on about an injury to the infant Tristram which, he pronounces, "will end in a *phimosis*."[3] "In waddled Dr. Slop," just as Corporal Trim is discussing radical heat and moisture. The gallant corporal recalls the ditch dug round each tent pitched in the swamps around Limerick, and concludes that the water which collected outside the tent was "radical moisture" and the dish full

1. *Loc. cit.*, Bk. III, Chap. XIII. See also the humorous observations (*ib.*, Bk. IV, Chap. XII) of Mr. Shandy about all the womankind of a house becoming an inch taller when there is a baby born, followed by Uncle Toby's pathetic expression of respect for pregnant women, "'Tis a piteous burden upon 'em," and Mr. Shandy's declaration of a somewhat modified sympathy.

2. *Tristram Shandy*, Bk. V, Chaps. xvii, xxxix and xli, and Bk. VI, Chaps. iii, iv and xiv. "Dr Slop made ten times more of it than there was occasion."

3. *Loc. cit.*, Bk. II, Chap. XIX.

of brandy burnt—by those who could afford it—inside the tent, was "radical heat." Dr. Slop declares that these two principles are mainly preserved by *consubstantials, impriments and occludents,* and remarks that "the corporal has had the misfortune to have heard some superficial empiric discourse upon this nice point. Sterne here clearly ridicules Burton's *Treatise on the Non-Naturals* where at page 4 he states that "This generous Undertaking of his [Boerhaave] has given great Offence to those who, not having their Heads turn'd that Way delight in their occult Qualities, *radical Moistures*, Malignities and such like Jargon, *Emperic* (*sic*) like." To "emperic" the following footnote is appended: "The Author does not mean that Sect of Physicians among the Ancients so-called, which took its Rise in the 38th (*sic*) Century, in the Reign of the Second or Third *Ptolemy*; but he means the modern Empirics (*sic*)."

Once more Dr. Slop appears in *Tristram Shandy.*[1] Widow Wadman makes delicate enquiries as to the prognosis of Uncle Toby's wound. It seems that Sterne knew that the ladies of York had the greatest confidence in Dr. Burton. Ferriar,[2] however, makes out that this particular narrative where impotence was suspected owing to a wound received in battle, was taken and recast from a foreign work. In Book VIII, Chap. xv, Dr. Slop describes to Uncle Toby the relations of the cæcum. Dr. Slop's opinion about barren cows is asked in the last chapter of *Tristram Shandy.*

The biographers of Sterne have been compelled to treat of the significance of a character who is so prominent in the earlier books of *Tristram Shandy.* They have, however, met with no difficulty in identification, and indeed internal evidence, as the "higher criticism" would say, is quite sufficient for the purpose. The "five shilling book on midwifery" and the parody of a passage in the *Letter to Smellie* prove that Burton was meant, even if the ample external evidence at the biographer's disposal had been wiped off the face of the earth. Ample while such evidence is, as regards Burton's electioneering and persecution, facts which explain why Sterne disliked and therefore ridiculed him, the records of the effect of the satire on the victim are scanty. Percy Fitzgerald states that Burton "boldly disclaimed all consciousness of any resemblance in the picture." Wilbur Cross makes a similar statement, but adds that Burton showed that he was "wofully lacking in a sense of humour." Jaques observes,[3] I may add, that "he that a fool doth very wisely hit, doth very foolishly although he smart not to seem senseless of the bob." Sterne was no fool, *Tristram Shandy* was read far and wide, and Burton may have had good reasons for simply disclaiming

1. Bk. ix, Chap. xxvi.
2. *Loc. cit.*, Chap. VII, "Story of Sorlisi."
3. *As You Like It,* Act II, Sc. 12.

the alleged identity without rushing into print about it. Another doctor, putting himself quite needlessly forward when Book II was issued, made out that the splashing and fouling of Dr. Slop when he fell from his horse betrayed him, not Burton. "Sir," said Sterne, "I have not hurt *you*. But take care, *I am not born yet* and you cannot know what I may do in the next two volumes." Both Fitzgerald and Cross relate this anecdote, which implies that Sterne meant, "I *have* hurt Burton." Yet Burton's friends, as has been explained, considered that the very same narrative betrayed him as Dr. Slop. Hence, as I have suggested, Sterne may have mixed up his characters, but in vain, for although two doctors might have had bad "croppers," only one, and a well-known one, wrote on the *Lithopaedus* error.

Conclusion.

I have endeavoured to compare Burton as he was with Burton as Sterne made him out to be. Dr. John Burton was an able scientific obstetrician, and his *Essay* shows that he was a man of practical experience. He was also a prominent citizen of York, the founder of its hospital, a noble philanthropic work the benefits of which are continued to this day. Besides, this famous obstetrician was a highly distinguished antiquary, author of a standard work still much prized by librarians. Doctors and archæologists quoted above, have alike testified to his merits. In days when the man-midwife was looked down upon, Burton lived, a gentleman and a scholar.

Percy Fitzgerald and Wilbur Cross have clearly shown, what indeed is very evident, that political and theological hatred accounts for the cruel persecution of Burton and for the burlesque character representing him in *Tristram Shandy*. "Dr. Slop runs through *Tristram Shandy*, an ill-tempered, ill-mannered, and vulgar Papist, the butt of all the current jests and prejudices against Roman Catholics. Sterne's frightful caricature of an able physician and learned antiquary is unexplainable without reference to the fierce religious passions awakened by the events of 1745." [1]

Ferriar, it is interesting to bear in mind, points out that Laurence Sterne avoids all allusion to Burton's Toryism, because he himself had grown disgusted with party violence.[2]

1. Wilbur Cross, *loc. cit.* pp. 80-81.
2. Illustrations of Sterne, 2nd ed. Vol. I., p. 139.

The Immunology of Pregnancy.

SOME COMPLEMENT-FIXATION, LECITHIN-PRECIPITATION AND COBRA-HÆMOLYSIN REACTIONS IN NORMAL AND TOXIC PREGNANCY; WITH A REVIEW OF RECENT LITERATURE.*

By H. Leith Murray, M.D.,

Hon. Bacteriologist to the David Lewis Northern Hospital, Liverpool; Clinical Assistant to the Hospital for Women, Liverpool; and late Obstetric Assistant to the University of Liverpool and the Maternity Hospital.

Since Paul Bar,[1] in 1907, expressed the view that the inter-relation of mother and fœtus in normal pregnancy was advantageous to both ("le plus bel exemple de symbiose homogène harmonique entre deux êtres") there has been an undoubted tendency to accept this idea as in the main the correct one. Ballantyne[2] has lately expressed himself in complete accord with the conclusion that, when there is a "fetus sanus in matre sana, there is developed an instance of harmonious symbiosis of the most wonderful kind and that at the end of such a pregnancy the mother emerges no worse, but rather the better, for the strain which has been placed upon her organs and tissues." He continues to state that "no one who has studied Bar's numerous analyses of the nitrogen, calcium, iron, phosphorus, sulphur, sugar, fat and chlorine exchanges between the mother and unborn infant can any longer continue to regard the latter as a necessary danger to the former, or to look upon pregnancy as a state of prejudicial parasitism." These quotations very clearly express what may be called the popular view of the present day. They imply that the so-called "symbiotic" relationship is one of mutual advantage.

At the same time it is well to recall the words of Ewing[3]—than which no better introduction to this short study of the Immunology of Pregnancy could be given. "It is a curious maladjustment of nature that places pregnancy among conditions difficult to separate from the pathological. We are accustomed to refer the high morbidity of gestation to the unhygienic influences of modern life, and love to refer to the Indian women who overtook the moving caravans of their tribes after a brief delay for parturition, but history says little about the women who never caught up with the caravans. To-day obstetrics in India, China and Africa deals with

* From the Ashton Hall Laboratories, Liverpool University.

the same ponderous process and meets the same formidable hazards as in Europe and America. The comparative study of gestation throughout the animal kingdom reveals a certain lethal tendency reaching its acme in some orders of insects in which ovulation necessarily entails death."

Groat[4] also reminds us that there is throughout nature a universal lethal influence connected with the reproduction of species. Plants wither and die or enter a dormant period when the seed matures.

These two views are obviously diametrically opposed to each other. In one, pregnancy is a "harmonious symbiosis"; in the other, it is immunologically speaking, an instance of reaction to an antigen.

It may at once be said that all recent work is in favour of the latter view: in other words there is evidence in normal pregnancy of a relationship comparable rather to that of a host and parasite than to any hormonal interaction.

Our knowledge of the conditions which may underlie the ordinary toxic phenomena occurring in pregnancy, has been markedly advanced in very recent years. More than one factor has contributed to this. The newer methods of immunological research have developed by leaps and bounds, and have been applied to the study of the problem under consideration. But above all the greatest advance was made when the necessity for a study of the *physiology* of the pregnancy inter-relation was appreciated; when the importance of a knowledge of the bio-chemistry of cases which were, clinically, instances of successful symbiosis was seen; in short, when the importance of controls became apparent. Nowadays it seems indeed strange that the desirability of this was not obvious earlier.

All the older work on the subject went on the supposition that, in toxic pregnancy, a normal mother was poisoned by an *excess*, or new development, of poison. More recent research has developed the theory that an *average* amount of poison may affect a mother who has not produced the requisite protection.

As Ballantyne has graphically expressed it, a pregnant woman may be said "literally to tingle to her very finger tips with the new life that is in her." The marked changes which occur in physiological pregnancy, particularly such of them as can in no wise be credited with any function in relation to the nutrition of the fœtus, demonstrate the intimate nature of the relationship and at once suggest the possibility of an immunity reaction in the maternal organism. In normal pregnancy these changes progress steadily till the termination of gestation, after which, except in the case of the breasts, they subside. In abnormal pregnancy, however, it is obvious that there are two stages of intoxication, (1) an early stage associated mainly with minor or major degrees of vomiting, and (2) a later stage expressed best by the term "eclampsism." Many cases of

even severe vomiting recover completely about the middle of pregnancy and have no further abnormality; while others, perhaps after an intermission of health, develop into eclampsism. On the other hand, pregnant women may have a perfectly normal course in the first half and succumb to the most virulent eclampsism in the second half. In any study of the Immunology of Pregnancy this phase character must, so far as is possible, be considered.

Towards the demonstration of immunity reactions in pregnancy much work has been put on record. Other reactions too, which, while not clearly of that nature, yet are of importance in being more or less specific of pregnancy, have been recorded by careful workers and merit attention. It has been a matter of no small difficulty to sift the literature on the subject and much of the work to be now quoted is as yet unconfirmed. Some of it, indeed, is so recent that there has not been reasonable time for this to be forthcoming. In general, it has been chosen on the grounds of the recognised status of the worker, or of his sponsor laboratory, or by reason of the full details of the experiments recorded.

Very unfortunately the broad issue of an immunity reaction in pregnancy has been somewhat obscured by the red herring of anaphylaxis. Many workers have lately been tempted by the novelty of the idea into this field of research. The anaphylactic condition is itself, of course, a phase in the development of an immunity—wherein two perfectly innocuous doses of certain alien materials, when injected with a definite interval, produce symptoms of intense poisoning. The first dose sensitises the animal to the larger and intoxicating second dose. In spite of the total omission of this aspect of the question from the introduction to the discussion on eclampsia at the recent British Medical Association meeting in Liverpool, there is no doubt whatsoever that the idea of eclampsia as an anaphylaxis in pregnancy is taking more and more hold on scientific opinion. Bar and Commandeur [5] in their very lengthy review of eclampsia consider the idea at least plausible and worth further investigation.

Like many another new theory it has been done to death. Certainly the peculiarity of the lesion and the difficulty experienced in isolating any toxic agent gave much reason for the inauguration of an investigation in any new direction. But after all the two main points on which the comparison with anaphylaxis has been based, namely the lesion and the nature of the attack, prove on investigation to be scarcely points of comparison at all. While undoubtedly fatal cases of eclampsia occur without fits, yet in the main it must be regarded as a convulsive disease. Now, anaphylaxis is convulsive only in certain animals, particularly the guinea-pig, and, so far as I know, undoubted anaphylaxis with convulsions has not been described in the human being apart from a purely terminal condition. Certainly some cases of convulsions after repeated

injections of salvarsan have been so regarded, but experimental investigation of the possibility seems conclusively negative.

In animals generally, the essentials of anaphylactic shock include (1) a condition of acute asthma: the lung being distended and emphysematous, with the alveoli blown up with air which is imprisoned by muscular spasm in the bronchioles: no post mortem of eclampsia has been recorded with such appearances; (2) a fall of blood pressure, and (3) a fall of temperature. The reverse of these is found in eclampsia. The mental acuity, too, of mildly anaphylactic animals is in striking contrast to the stuporose condition of eclamptics, and finally, the pre-eclamptic state has no counterpart in the anaphylactic condition.

The second point of comparison, the lesion produced, has even less sound basis. Hæmorrhage into the liver and degeneration of the cells are common to both, but the typical and pathognomonic lesion of eclampsia, which will be studied in detail later in this paper, is not fulfilled in anaphylaxis.

It would appear that many workers have fallen into the error of deducing, because it is readily possible to demonstrate sensitisation in a pregnant animal and equally possible to induce anaphylaxis by the injection of a quantity of the substance (usually placental extract) which presumably sensitized the animal, that *therefore* anaphylaxis occurs in the natural state.

But surely sensitisation and intoxication are two things apart, and the second need not follow the first. Immunity may necessitate a sensitisation but that is no argument for prophesying anaphylaxis as the cause of every disaster. A case of tuberculous infection gives every evidence of sensitisation to tuberculin, yet it is perfectly obvious that cases of tuberculous infection do not die of anaphylaxis. Similarly with pregnancy: to demonstrate sensitisation to placental extract is to make an important advance in our knowledge; to confer anaphylaxis on such an animal is an interesting confirmation of the fact that the animal was sensitised; but to straightway jump to the conclusion, from the very broad points of comparison discussed above, that eclampsia is an anaphylactic phenomenon is a step wholly unwarranted by the results obtained.

On these grounds I cannot accept the conclusion in many valuable papers—the work is admirable but the deductions are inadmissible. Further, as will be apparent later in this paper, there is no need to implicate such a complex mechanism as anaphylaxis; a type of direct intoxication will be described which is capable of producing the entire lesion of eclampsia.

What evidence, then, is there in pregnancy for and against an immunity reaction to the contents of the uterus? This will best be discussed under several headings.

A.—Sensitisation Reactions.

The application of the anaphylactic reaction to the demonstration of antigens (*i.e.*, substances capable of producing antibodies) has the merit of extreme delicacy, but all work in this direction must be strictly limited to the injection of homologous material. The inoculation of, say, human placental extracts into rabbits has really no more practical value than the injection of horse serum or any other alien protein under the same conditions. A sensitisation to *species* is all that can occur. In the case under consideration, however, such experiments do have a value in that they serve to show the difficulty that arises in preparing placental tissue for injection. If prepared as a suspension it can be injected only into the peritoneal cavity, for free cellular debris, no matter how fine, will cause clotting in the veins. Even in the supposed absence of free cellular debris Engelmann and Stade [6] have reported sudden death in 17 of 19 rabbits inoculated with filtered placental juice. This occurred usually within a few minutes of the injection but could be readily prevented (13 rabbits) by the simultaneous, or immediately preceding, injection of any substance, such as leech extract, preventing clotting. Dryfuss [7] considered that fatal results like these were due to the nucleo-proteid present, but as most workers have not experienced this difficulty it is reasonable to suppose that the filtration was imperfect. Engelmann [8] also has described an intravascular clotting as occurring after the injection of liquor amnii from eclamptics while the normal fluid produced no such result. On one occasion I have injected liquor amnii from an eclamptic and on three occasions normal liquor amnii into the ear vein of rabbits without untoward symptoms.

Anderson and Rosenau [9] failed to produce anaphylaxis in guinea-pigs by repeated inoculations of guinea-pig fœtal serum, but readily produced it with guinea-pig placenta. The latter, however, had been allowed to autolyse for a few (3) hours, and, as I recorded in this Journal,[45] it is an easy matter to cause definite anaphylaxis with sterile autolysed (24 hours) homologous organs—in this instance guinea-pig liver into guinea-pigs. The element of doubt in these experiments has been removed by later workers, and I am now prepared to admit that these results of Anderson and Rosenau are truly anaphylactic.

On the other hand, Johnstone [10] absolutely failed to induce anaphylaxis in any of his homologous experiments. They were limited to 4 rabbits and 1 guinea-pig and consisted of intravenous injections of filtered placental extracts.

Thies [11] and later Lockemann and Thies [12] injected the fresh serum of fœtal rabbits into the ear vein of young rabbits. A first inoculation produced a positive result in 43 per cent. of pregnant animals, while a second inoculation eight days or more later proved

positive in 100 per cent. of pregnant animals and in 56 per cent. of non-pregnant animals. There is here some evidence, firstly, that pregnant animals are *already* sensitised to some element in homologous fœtal serum and, secondly, that non-pregnant animals *can* be sensitised to it. These positive results are opposed to Anderson and Rosenau's negative findings, but they have been still more recently confirmed by Mosbacher,[13] who considers that there is no distinction between the results obtained with fœtal serum and with placental extracts. He has successfully sensitised guinea-pigs with fœtal serum and later produced fatal anaphylactic shock with placental filtrate—that is to say, there is an antigen circulating in fœtal serum identical with one in the placenta, both of them being alien to the mother.

The 44 per cent. of negative results in the non-pregnant animals of Lockemann and Thies and the completely negative results of Anderson and Rosenau with fœtal serum may probably therefore indicate not an absence of sensitisation in these cases but merely an insufficient dose, for it appears clear that the anaphylaxis is more severe when this second dose is placental in nature. The suggestion, then, is here made that fœtal serum sensitises the mother by virtue of a small fraction of placental antigen which has reached it from the umbilical vessels—a fraction so small that it is often insufficient, in the quantities of serum available, to produce anaphylaxis when given as a second dose.

In general, Mosbacher's work on the production of sensitisation with homologous material confirms that related above as also the researches of Hoffbauer. With a first dose of 0·25 c.c. and a second of 2 c.c. of placental extract (prepared by filtering a purée of placenta removed by laparotomy from pregnant guinea-pigs) he has demonstrated fatal anaphylaxis in non-pregnant animals, whereas in pregnant animals a single dose was alone necessary. Non-pregnant control animals receiving a single dose showed only slight symptoms lasting 10 minutes, whereas the affected animals developed the typical symptoms of moderate or fatal anaphylaxis, with, in fatal cases, a well marked emphysema of the lungs and an absence of thrombosis.

He was also able to demonstrate that guinea-pigs in late pregnancy usually survived the anaphylactic shock, except in cases with many fœtuses, whereas in early pregnancy the seizure was usually fatal in 2-3 minutes. One case which he had employed as a control and which died acutely was only proved to be pregnant by the microscope. This will be referred to later.

B.—Epiphanin Reactions.

Under this heading may be discussed a group of reactions occurring in vitro and demonstrating an immunity reaction.

(1) *Complement Fixation Reactions.*

Fieux and Mauriac,[14 15] using an antigen prepared from the villi of a 2-months' pregnancy in which abortion had been induced for intractable vomiting, have obtained positive results in early pregnancy.

5 pregnancies of 3–5 weeks, all negative.
8 pregnancies of 2–3 months, all positive.
7 pregnancies of 3–4 months, 1 positive; 2 doubtful; 4 negative.
14 pregnancies of 4–9 months, all negative.
10 non-gravid cases with amenorrhœa, all negative.
3 cases (1–2 days) post abortum at 2–3 months, all positive.
7 cases (1–2 days) post abortum at 4–5 months, all negative.

One case of pregnancy positive at $2\frac{1}{2}$ months was negative 3 months later, and two cases of intractable vomiting with symptoms of toxæmia were markedly positive. They therefore claim to have demonstrated between the 2nd and 4th months of pregnancy a specific antibody for young chorionic villi. Their antigen was prepared by drying placenta over sulphuric acid, powdering and macerating for 24 hours.

Chirié and Beauvy[16] got negative results with an antigen prepared from dried and powdered placenta in 5 cases of normal pregnancy and 1 case of eclampsia. Frankl's[17] work, and also that of Lemaire and Laffont,[18] was similarly negative.

Bar and Daunay[19] with placental antigens and a rabbit-sheep hæmolytic system tested 11 normal and 3 toxic pregnancies. They found all cases over 5 months pregnant negative to antigens prepared from placenta of any age, but obtained an occasional positive result in pregnancies of less than 5 months when an antigen of placenta earlier than 4 months was employed. Twenty-nine controls were negative. Using a fœtal antigen they report a positive result in 2 out of 21 pregnancies tested.

My own results have been interesting. A human-sheep hæmolytic indicator[65] was used and antigens were prepared from the villar envelope of early pregnancies and also washed placentæ of a later date. It will be advisable to give details of the preparation.

The material for antigens No. 1 (a 2-months' abortion resulting from a fall), No. 2 (ruptured twin ectopic gestation of about 5-6 weeks: specimen removed at post-mortem examination), and No. 3 (2-months' abortion) was snipped with scissors from the specimens, cut very fine, pounded in an agate mortar till homogeneous and divided into two portions. The first was rubbed up in absolute alcohol, placed in a water bath at 60° C. for one hour, well shaken and left at 37° C. for 24 hours, again shaken and, after sedimentation, the clear fluid stored in an ice-chest for at least a week before use. To the second portion, a proportion of gypsum sufficient to

thoroughly dry it was added in a mortar and thereafter alcohol was added to the resulting powder and the preparation completed as above.

Antigen No. 1 proved most successful, and both portions equally so. Nine normal cases between 2-3½ months gave a well marked positive result, while 15 cases from 4-9 months and 16 non-pregnant controls were completely negative.

Antigen No. 2 (first method of preparation) gave a positive result in 2 of 5 cases between 2½ and 3½ months. Twenty-two cases between 4 and 9 months and 10 controls were negative.

With antigen No. 3 no positive results were obtained (4 cases between 2-3½ months; 6 cases between 4-9 months).

Seven other antigens were prepared (Nos. 4 and 5 from 5-months' placentæ; No. 6 from 7½-months; Nos. 7 and 8 from full term; No. 9 from an 8-months' eclamptic and No. 10 from a full-term eclamptic placenta. The material was snipped off with scissors from different depths of the placenta and infarcts where present were included; coarsely minced, thoroughly washed in normal saline, finely minced, bruised in a mortar, divided into two portions and treated as above. In no case, with either portion, was any evidence of complement fixation obtained. Altogether the cases numbered 43, ranged from 2-9 months and included 2 albuminurics and 3 eclamptics.

It appeared possible that some, or all, of the negative results might be due to an absence of antigenic property as the result of an ineffective method of preparation, and accordingly it was considered advisable to test these as regards their general antigenic power. Schatiloff and Isabolinsky [20] have shown for the Wassermann-Neisser-Brucksche reaction how the organs of various animals differ in this respect. Human syphilitic liver comes first, then normal guinea-pig heart, followed by guinea-pig liver, rabbit's liver, ox heart and normal human liver in a descending scale.

My experiments gave a clear indication of an antigenic property for syphilis in antigens No. 1 (first preparation) and 10 (first preparation). The former proved positive once in 6 cases of well marked syphilis and the latter 3 times in 8 cases. Neither of the cases from which the antigen was prepared showed the least symptom or sign of syphilis. In the abortion case this misadventure resulted, as already stated, from a fall downstairs. Wassermann reactions were not done it is true, but, as will be seen later, in the case of eclampsia a positive reaction would have been valueless as an indication of syphilis.

It is clear, then, that the method of preparation did not inevitably destroy the antigenic property, but the question of an explanation of the negative results in pregnancy after the 3½-month cannot as yet be answered.

(2) *Diffusion Reactions.*

Weichardt[21] in 1908 described a method of demonstrating an immunity reaction with toxin-antitoxin mixtures. A hollow glass tube, shaped like a very flat letter U, has at its middle point a removable glass partition. One arm of the U is filled with a very weak solution of potassium hydroxide coloured with phenolphthalein, and the other with somewhat stronger acid. When the partition is removed, diffusion occurs and after a fixed time there will be a diminution of the alkalinity of the red fluid with consequent loss of colour. Controls showed a diffusion constant for the solutions employed. If to the acid-containing limb of such a U-tube a small quantity of very dilute diphtheria toxin was added and to the alkali-containing limb dilute diphtheria antitoxic serum, it was found that the rate of diffusion was very much more rapid, and that therefore the loss of colour was greater in a given time than in a control tube with the same quantity of diphtheria toxin in one arm and saline solution in place of antitoxin in the other. Later Weichardt, by constructing his U-tube as a balance, employing salines of light and heavy specific gravity and adding toxin and antitoxin as before was able to show a greater deflection of the balance to one side than in control tubes.

Working under Weichardt's direction, Mosbacher[13] has applied the diffusiometer to the demonstration of a reaction in pregnancy and has found it strongly positive in the later stages in both laboratory animals and human beings. This was confirmation of certain earlier experiments on guinea-pigs where mixtures (*a*) of placental extract and pregnant serum, and (*b*) of placental extract and normal serum were incubated at 37° C. for 5 hours, filtered and inoculated into pregnant guinea-pigs. A dose of (*b*) was chosen sufficient to cause marked symptoms of anaphylaxis, yet the same dose of (*a*) produced no result. Evidently here there had been some neutralization of the toxic element in the placenta.

These diffusiometer (toxin-antitoxin) results, as has been stated, were best marked towards the end of pregnancy, yet sensitisation tests (antigen-antibody), as already described, proved more successful in early pregnancy. The correlation of these would appear to afford some basis of explanation for the phase-character of the toxæmias observed in pregnancy. The resistance to syncitium, as these experiments would indicate, may comprise not only a neutralisation (by antitoxin) of diffused products of that tissue, but also a direct attack (by lysin). This, of course, is very comparable to the process occurring in most bacterial infections. It would be futile to enlarge on the idea at present but, while undoubtedly theoretical, the conception does have some foundation in actual experiment, and fitting in, as it does, with the fact of the different incidence of the ordinary toxæmias such as hyperemesis and eclampsia, should be borne in mind.

(3) *Precipitin Reactions.*

Lemaire and Laffont [18] removed liquor amnii from the punctured bag of membranes after disinfection of the vagina. This fluid was tested against 13 sera (females at term, after labour, and virgins). An abundant precipitate formed in all, as also when the serum was heated to 55° C., but they could detect no quantitative difference between pregnancy and the non-pregnant condition. Similar negative results have been obtained by myself in 16 pregnancies and 15 controls, using both normal and eclamptic liquor amnii—not however obtained by puncture. Dilutions were carried to the limit of precipitation without result.

(4) *Polarimetric Reactions.*

Perhaps the most interesting of all recent work on the subject has been done by E. Abderhalden.[22 23] By polarimetric methods he has demonstrated that the serum of pregnancy breaks up placental albumen and peptone prepared from placental albumen. This peptone must be carefully prepared as laid down in his monograph,[24] and 1 c.c. of a 10 per cent. solution is thoroughly mixed with 2 c.c. of absolutely clear centrifugalised serum in a polarimeter tube. A reading is at once made and the mixture then incubated for 36 hours—readings being taken every 4 hours. With non-pregnant serum, in the instrument used, a rotation of only 0·03° was observed, while invariably pregnant serum gave a higher alteration. He has correctly diagnosed pregnancy by this means in 75 cases and affirms that the reaction is absolutely specific and infallible.

(5) *Dialytic Reactions.*

In conjunction with the polarimetric reaction, Abderhalden advises that a dialytic reaction, which he has described, be also employed. This has the same basis as the other—namely, the ability of the serum of pregnancy to break up placental albumen, and he finds that the two correspond qualitatively. Fresh placenta, subdivided and washed, is coagulated by boiling in slightly acidulated water till the water no longer gives the biuret reaction. This may take 5–10 or 15 minutes. To 1 gramme of this shredded coagulated placenta in a dialysation tube is added 2-3 c.c. of serum, the mixture is surrounded by 15 c.c. of water and the whole incubated for 12–16 hours. The dialysate is tested for the red biuret reaction, or preferably with triketohydrinden which develops a blue colour on boiling when the test is positive. Controls of placenta alone and serum alone are necessary. Only pregnant serum gives a positive reaction and this is sometimes to be detected as early as the second week.*

* In a still more recent paper by the same worker (*Deutsch. Med. Woch.*, Bd. 38, no. 46, Nov. 14, 1912) based on 300 cases, the reaction is stated to be best marked early in pregnancy and therein confirms Mosbacher's results already cited.

C.—Therapeutic Inoculations.

A certain amount of evidence is available that normal pregnant serum when inoculated in the toxicoses of pregnancy has a beneficial effect. Mayer and Linser [25] have reported a case of severe universal herpes recurring in pregnancy treated at the fifth month by the intravenous injection of healthy pregnant serum (8th month) in doses of 10–20 c.c. at intervals of three days. A preliminary dose of 10 c.c. of non-pregnant female serum produced no improvement. Pain was very severe, the bed linen was constantly soiled with the freely discharged pus and the urine showed casts and albumen. A striking effect on the eruption was rapidly produced without interruption of pregnancy. Mayer [26 27] has also narrated (*a*) 3 cases of urticaria with severe pruritus in pregnancy near term, (*b*) a case of herpes persisting after term, and (*c*) a case of eclampsia, all materially benefited by 1-3 doses of 10 c.c. of normal pregnant serum. In the last there was profound coma with 7 per cent. of albumen.

Freund [28] has reported the following cases: (*a*) uncontrollable vomiting with neuralgia; æt. 24, 3 months pregnant, rapid recovery after 2 doses of 24 c.c., and (*b*) 3 cases of severe eclampsia; received 36–58 c.c.; rapid amelioration with cessation of fits. The serum was obtained from a healthy pregnant woman near term.

Interesting as these results are, some doubt is thrown on the specific nature of the reaction by Freund's description of 6 additional cases of eclampsia treated with 20–80 c.c. injections of freshly drawn horse serum. In each case an excellent result was obtained—only 1-4 convulsions occurring thereafter.

It appears very advisable that, where possible, further investigation of this line of treatment should be made.

The foregoing summarises the lines of research adopted by recent and proved workers. While much of it still awaits confirmation the general unanimity of the results makes it highly probable that such confirmation will shortly be forthcoming.

D.—Reactions not definitely Immunological.

Certain other reactions must now be briefly reviewed, which, while not definitely immunological, or even absolutely specific, yet have this in common that they appear in normal or abnormal pregnancy and in only a few other conditions.

(1) *Antitryptic power of pregnant serum.*

Brieger and Trebing [29] first showed that in pregnancy, as in carcinoma, there is an increased antitryptic power during the first half of pregnancy. This may bear some relation to the increased protein metabolism occurring during that period of pregnancy—when the fœtus lives at the expense of the mother, and more nitrogen is lost than is absorbed. Gräffenberg [30] and Heide and

Krösing [31] have confirmed Brieger and Trebing, but Becker [32] found it increased only at birth. Rosenthal,[33] adopting the method of Fuld, found it increased almost with the onset of pregnancy—the rise continuing till 2-3 weeks after delivery. A high index was also obtained in fevers, nephritis, exophthalmic goitre and especially carcinoma.

(2) *Lipoid Reactions in Pregnancy.*

Neumann and Hermann [34] found that an increase of the lipoid content was notable in pregnancy except at the very commencement when there was a diminution. They were able to demonstrate a cholesterin reaction characteristic of pregnancy by the end of the third month. The same workers [35] have recently shown that the increase is shared both by cholesterin ester and neutral fat but particularly the latter, while free cholesterin and phosphatides show no alteration.

Roemer [36] has confirmed much of this work and considers that a quantitative lipoid reaction is characteristic of pregnancy after the 3rd month.

Gross and Bunzel [37] demonstrated in 6 cases of eclampsia that the serum precipitated suspensions of lecithin (0·2 c.c. serum + 0·5 c.c. suspension of 0·2 per cent. lecithin); this reaction appeared shortly after the first fit and persisted for a variable time. Simple albuminuria of pregnancy and Bright's disease did not give it, unless with symptoms of eclampsia.

An opportunity was taken to confirm this work in four cases of eclampsia, using a very pure heart lecithin. A preliminary neutralisation was necessary as the lecithin had become slightly acid. A very obvious flocculation occurred in three of the four cases and lasted for 1-3 days; the fourth case was absolutely negative on the single occasion that it was examined—8 hours after the first fit in a case dying 4 hours later. Eighteen normal cases at various stages of pregnancy showed no precipitation.

(3) *Wassermann Reactions in Eclampsia.*

Gross and Bunzel [37 38] have reported 11 cases and Nadosy [39] 3 cases of eclampsia with a positive Wassermann reaction in all. The former are careful to point out that the reaction was only positive at *some* stage, and in one (the fifth) case it is seen that this occurred for one day only, and this $1\frac{1}{2}$ days after the third and last fit. On the other hand Alsberg,[40] using antigens of syphilitic liver, guinea-pig heart and normal eclamptic placenta failed to obtain a positive result in 5 cases. Thomsen[41] and Heynemann[42] each report 8 negative cases.

Semon,[43] using the original Wassermann technique, in 20 cases found two (or perhaps three) positive, and then only very temporarily

in severe cases. It must be clearly understood in connection with these results that a Wassermann reaction is in no sense comparable to a bacterial complement fixation test. It is found in other diseases than syphilis [44] and is caused by lipotropic substances rather than antibodies. That the placenta of eclampsia contains substances more readily able to fix these bodies than can the normal placenta is suggested also by the very clear binding which took place between eclamptic placenta and syphilitic serum in my experiments already alluded to under the heading of complement fixation.

(4) *Cobra Venom Reactions in Pregnancy.*

In previous papers [45] [46] on eclampsia I have endeavoured, partly as the result of a minute examination of the lesions, and partly from certain clinical data which will be presently enumerated, to draw a general comparison between that condition and venom poisoning. As some misapprehension has arisen over this idea, fantastic as some consider it, it will be advisable to shortly recapitulate the grounds on which the comparison was made and to give further evidence which has accumulated in the meantime. Every opportunity has been taken in the interval of having the question discussed before societies qualified to judge, but so far, no pertinent criticism has been launched in any way tending to invalidate the broad conclusion.

It is customary to describe the lesion in the eclamptic liver as unique. As a preliminary, it may be asked: wherein lies the unique quality?

(1) With a fully developed lesion there occurs massive focal necrosis at the periphery of the liver lobules. Opie [47] in a study of 500 morbid human livers observed this only in 4 cases, and these were all associated with toxic pregnancy.

(2) There is an absolute independence of the degenerative and the massive focal necrosis in the liver. In other words, it is certain that the massive necrosis does not arise as the last stage of a degenerative process, but is produced by a distinct, sudden, violent and localised assault on the cells affected. All experimental evidence goes to prove that such an assault is a purely nutritional one—that the occlusion of vessels has occurred.

(3) There is an absolute lack of relation between the clinical severity and the (apparent) degree of lesion. Cases of eclampsia die without any discoverable necrosis in the liver, *e.g.*, Case No. 1 already reported [45] with 14 fits and a duration of 28 hours. Necrosis therefore is not essential to a fatal result. On the other hand, cases occur where recovery supervenes, yet the urinary analyses give every indication that liver necrosis (*i.e.*, autolysis) is present. What, then, determines necrosis in any particular case? The explanation afforded by the interaction of a hæmolytic-hæmagglutinative toxin will be discussed below.

In the meantime it must be emphasised that the lesion in the liver may not be merely *apparently* slight but *in reality* slight. It is certain that cases of eclampsia die with visceral lesions perfectly compatible with the continuance of life, but an examination of the cranium will usually show cerebral hæmorrhage to be the cause of death. Of 6 cases where I have had an opportunity of examining the brains of eclamptics, massive hæmorrhages (extending into the ventricles in 2 cases) were present in 4 cases, and from their extent or their implication of the basal nuclei it was judged in 3 of these that life could not have been continued. A fifth case showed a single hæmorrhage, the size of a hen's egg, which filled the left temporo-sphenoidal lobe and had burst through the cortex into the meninges. This large proportion of hæmorrhage is greatly in excess of that usually accepted, but as a record of six cases it has its interest.

The liver lesion, then, in such cases may be only an early one or even an essentially mild one, and in estimating the relation of lesion to fatal result this factor must not be forgotten—more especially as it is not always possible to obtain a full examination in cases dying in child-birth. With a tendency to cerebral hæmorrhage present, convulsions must be highly dangerous quite apart from the exhaustion produced, and it may be permissible here to express the hope that the success which has attended Wallace's [48] trial of a suggestion of mine for the abolition of the fits—the intrathecal injection of magnesium sulphate—may be continued with a more general adoption.

Coming now to a discussion of the agents which can produce the fully developed hepatic and cerebral lesions of eclampsia, it appears to me that one is led inevitably to the conclusion that the following elements or principles must be present: (*a*) a hæmolytic (cytolytic), (*b*) a hæmagglutinative, (*c*) a thrombotic (fibrinous), and (*d*) an endotheliolytic.

(*a*) *Hæmolysis* (*cytolysis*). The presence of this element is admitted by all and requires no elaboration.

(*b*) *Hæmagglutination.* There is much difference of opinion in regard to the presence of this element. My own investigation is absolutely in accord with Flexner [49] and Welch [50] for I have found definite hæmagglutinative (hyaline), as distinct from fibrinous, thrombosis in every case where necrosis had occurred in the liver. This hyaline thrombosis is produced by the massing of red cells without the intervention of fibrin and has been proved by Pearce [51] to be capable of completely occluding small vessels in the liver. In three hæmorrhagic brains also, an undoubted non-fibrinous thrombosis was observed in several of the vessels in near relation to the areas of hæmorrhage and any idea that these were mere artefacts was negatived by this localisation. If the liver necrosis be due to these agglutinative thrombi, it will at once be understood how

readily the appearances in the liver may vary as the result of some slight alteration in the proportion of the hæmolytic and hæmagglutinative principles. If the latter be powerful enough to produce an unyielding thrombus, necrosis will occur; while a slight increase of hæmolytic power, by rapidly dissolving the red cells, will absolutely prevent agglutination and thereby the possibility of necrosis.

(*c*) *Fibrinous Thrombosis.* It may be fairly questioned, however, whether the hyaline or the fibrinous thrombosis is the chief cause of the necrosis. Fibrinous thrombosis is invariably present in the lesion and, occurring as it does, secondary to *any* hæmolytic poisoning, I may have failed to give it the position it merited. In case No. 1 already alluded to, the presence of marked fibrin in the liver and other organs, coupled with a total absence of hyaline thrombi and necrosis, inclined one strongly to the view that necrosis was more particularly associated with hæmagglutinative thrombi. This may or may not be so—no further illustrative cases have since come my way. But after all, the point I am mainly concerned with at the moment is less the *effect* of this hæmagglutinative element than the simple admission and demonstration of its *presence.* I can see no valid reason for denying this, and I am convinced that no one who, like Flexner and Welch, cares to make a sufficiently careful examination of the smaller vessels in close relation to the necrosed areas, can fail to confirm the presence of these agglutinative thrombi. For a fuller discussion of the point my earlier papers may be referred to.

(*d*) *Endotheliolysis.* There will be but little disposition to doubt the presence of this toxic principle in many cases of eclampsia. Its results are well seen both in the liver and brain and are signalised by irregular hæmorrhages. The changes in the endothelium are best studied in the brain; great irregularity of the cells lining the vessels can be seen in immediate relation to the areas of hæmorrhage —particularly small hæmorrhages where the degenerated focus can be studied as a whole; the cells are usually completely broken down but sometimes they appear much swollen and granular.

Clinically it is at once apparent that still another toxic principle must be present—a *neurotoxin.* It is less easy to demonstrate this microscopically, but this is by no means the only condition where the same difficulty is presented. Changes in the nerve cells I have noted and described [46] occurring in the region of the hæmorrhages; they are very definite but it is impossible to say that they are not secondary to the hæmorrhages. I have examined the cortex and basal nuclei in areas unassociated with hæmorrhage but have not observed the fragmentation of the Nissl granules and occasional eccentricity of the nucleus so commonly to be seen in the neighbourhood of hæmorrhages.

To sum up, then, there are apparently five components of the

eclamptic toxin—a thrombotic, a hæmolytic, a hæmagglutinative, an endotheliolytic and a neurotoxic. Microscopically, the first two of these can be demonstrated to be constantly present; the third may be present but masked by the hæmolytic element; and the fourth may only be detected by examination of the brain. The fifth is clinically obvious in all cases.

Sufficient basis has now been given for a comparison with venom poisoning. In certain immune sera, in several of the higher vegetables, and in various bacterial toxins, are to be found one or more of the above five principles, but in venom poisoning and in this alone of *all* intoxications, are all five to be found. The vastly different lesions produced by different snakes merely result from the varying proportion of these principles which occurs in different groups, *e.g.*, in cobra the results are mainly hæmolytic, and in crotalus mainly endotheliolytic with relatively little hæmolysis and agglutination. It will be noted, therefore, that although every venom contains all five principles, the lesions produced by any one are no more representative of snake poisoning in general than may be the lesions of any one case of eclampsia. The polymorphism of lesion in eclamptic cases as a whole corresponds to that of poisoning by snakes as a whole.

In addition to a pathological [52] [53] similarity, numerous clinical links bind the two together. The extreme rapidity and completeness of the recovery which may occur, the preliminary raising of the blood pressure which has been described in experimental cobra poisoning and which may last till very near the end,[54] the tendency to fever, hæmaturia, amaurosis, headache, general convulsions and to septic infection are features common to both.

I have dwelt at some length on this comparison, for the importance of confirming and admitting this modern application of the old "Eve and the Serpent" allegory will be readily understood. It at once gives an indication (1) that a single agent may be at work, and (2) of the type to be looked for. Venoms are enzymal in origin and this close and remarkable similarity inclines one to the view that in pregnancy, or at least in eclamptic pregnancy, a single definite body of this nature is causative. Originating as it probably does in the gland-like cells of the placenta—an organ which must always be regarded as no less complex than the liver—bio-chemical research should certainly be directed towards extracting such a body from the normal and eclamptic placenta.

Flexner and Noguchi [55] have demonstrated a very broad specificity in the venomous constituents, *e.g.*, anticrotalus serum prevents the hæmolytic action of all venoms, there being only a quantitative difference, while antivenin neutralises the hæmolysis of cobra and crotalus, but imperfectly that of certain others. More recently Noguchi [56] has expressed the view that the specificity is narrower

than earlier work indicated. The general similarity, however, and the unique nature of the toxin suggested the advisability of testing on the one hand non-pregnant and on the other normal and abnormal pregnant sera with various venoms to determine whether any differences could be made out between the two as regards resistance to hæmolysis or the production of precipitins.

Experiments were begun in 1910, at which time I found in the literature only two papers bearing on the point. The first, by Bauer,[57] described a cobra-hæmolysin-inhibiting element in fœtal blood from the umbilical cord, and the second by Bürgers[58] confirmed Bauer's work and recorded the same principle in pregnant serum. In these experiments, cobra venom was mixed with, and then incubated with, serum and washed human corpuscles.

Since then I have discovered several papers, mostly of a later date. Bauer and Lehndorff[59] have observed an activation of cobra hæmolysis by *inactivated* serum from women at the end of pregnancy. Heynemann,[60] employing inactivated pregnant serum, horse corpuscles and cobra venom demonstrated an activation in one of two cases in the first two months, in 50 per cent. at the third month and in all cases of a later date. In 3 of 4 cases of eclampsia the activation was very marked. Frankl and Richter[61] have confirmed this last observation in eclampsia.

v. Graff and v. Zubrzycki[62] with the same technique as Heynemann, have recorded the results in 29 cases of pregnancy, 19 abortions and 14 post partum cases: activation began in the first half of the third month, was always well marked from the fourth month onward, and lasted for three weeks after parturition. They also found a positive reaction in 70 per cent. of cases of carcinoma, in 12 per cent. of cases of other diseases and in 12 per cent. of normal women.

It will be noted that all the foregoing, with the exception of the two first mentioned, were obtained with decomplemented serum. They are evidence, therefore, merely of lipoid binding; this has been confirmed by Roemer[63] who has found that activation in pregnancy goes hand in hand with the increasing lipoid content.

The original experiments now to be recorded are of a totally different nature in that the serum was not inactivated. Although in the form of a complement fixation test I hesitate to class them as such, for cobra venom in addition to being an antigen has a peculiarly strong action as an amboceptor, or at least as an anti-complementary body,[64] when in the presence of considerable quantities of fresh serum.

Cobra venom kindly sent me from Dr. Calmette's laboratory, was preserved as a stock suspension in absolute alcohol, the requisite dilution, as gauged by a careful preliminary standardisation, being made freshly for every batch of sera tested, by adding the suspension

very slowly to saline. The technique adopted throughout was that advocated by Fleming,[65] 10 per cent. of sheep's corpuscles being used as an indicator and an incubation period of 2 hours adopted to thoroughly saturate the venom. The 10 per cent. of human sera having no hæmolytic amboceptor for sheep corpuscles were discarded.

The details of the results are as follows:—

Normal Pregnancy.

									Total
Primiparous cases	2	2	4	5	11	14	16	17—	71
Cases positive	1	—	1	3	9	12	16	15—	57=80% positive.

Month	2	3	4	5	6	7	8	9	
Multiparous cases	—	1	6	8	22	14	24	33—	108
Cases positive	—	—	1	2	15	10	16	27—	71=66% positive.

A positive result indicates that hæmolysis was restrained. The percentage of positive cases it will be seen works out in primiparæ as 80 per cent., and in multiparæ as 66 per cent. It will be noticeable, too, that the percentage of both increases steadily as pregnancy advances. A positive result usually ceased by the end of the first week after delivery—in a few cases it persisted for 10 or even 14 days. In no case where a positive result was obtained did the reaction disappear short of delivery; many cases were tested two and three times at different stages and a few three, four or even five times. Stale serum proved invariably negative.

Abnormal Pregnancy.

In seven cases of eclampsia between the seventh and ninth month a positive reaction was only obtained twice (28 per cent.) during the acute attack. In one of the negative cases pregnancy continued uninterrupted and one month later the reaction was positive. At this time the patient presented no symptoms although there was a trace of albumen still in the urine.

Two cases of severe albuminuria of pregnancy were both positive; neither showed any symptoms of the pre-eclamptic stage.

Only one case of impending eclampsia has been available and this was negative.

Six cases of severe hæmorrhage in multiparous women were tested from 1-4 days after the hæmorrhage had occurred to see if any proof were forthcoming of an increase of antibody (presuming that the reaction was of that nature) in the circulation as the result of the bleeding—a phenomenon which v. Schroeder has clearly demonstrated in bacterial infection. Four were positive (66 per cent.), so that no evidence was obtained.

Controls.

In nine of forty non-pregnant controls (22·5 per cent.) a positive reaction was obtained indistinguishable from that of pregnancy.

Fifteen of these cases were healthy individuals, male and female, and the rest included various unselected cases from a general hospital. The nine positive cases comprised 3 healthy men, 2 healthy women, and a case each of locomotor ataxia, chronic bronchitis, carcinoma cervicis uteri and subacute rheumatism.

The reaction then, is by no means specific, and, for all that one can say, is in no sense an *essential* one. At the same time it is of interest in that it was developed as the result of a pathological study of eclampsia: in that it showed a clear difference between normal pregnancy and the non-pregnant condition; and in that this difference was abolished in eclampsia.

It was hoped to include in this investigation a series of precipitin reactions with crotalus venom, but unfortunately I have been unable to obtain any. Rattlesnakes are exceedingly nervous if they are handled and usually commence a suicidal fast. Dr. Raymond Ditmars of the Bronx Zoological Park, N.Y., kindly sent me a supply of venom from the Northern Water Moccasin (*ancistrodon piscivorus*), but this proved to have no precipitating action. A short series of hæmolytic reactions on the above plan confirmed the results with cobra venom.

A further point—a purely theoretical one—may be mentioned in this connection. It is known that the calcium content of the blood increases rapidly at the end of pregnancy, and cases of toxic pregnancy have been recorded [67] where the administration of a salt of calcium has caused a rapid disappearance both of albuminuria and œdema. Bang and Overton [68] have shown that the addition of calcium chloride (5 per cent.) diminishes the toxicity of cobra venom in the proportion of 100 to 1. There may here be some indication that the rise in pregnancy is a protective reaction against some body of a similar nature.

The Relation of the Normal to the Toxic in Pregnancy.

When one comes to analyse the foregoing review of recent work on immunity in pregnancy, it is remarkable how little of it has a bearing on the relation of the normal to the toxic. Further results in the direction of the epiphanin reactions described, with a comparison of the normal and the abnormal, are much to be desired. Even then the question is by no means an easy one for immunity reactions are no strict measure of the immunity developed. Unfortunately my own complement fixation tests in early pregnancy included no abnormal cases, but the markedly positive result in a case of toxic vomiting recorded by Fieux and Mauriac need not imply that protection was here unusually well developed; more especially as in this case the antigen itself was prepared from a toxic ovum.

With a proved immunity reaction in pregnancy, it is clear that

all hormonal interactions—such as thyroid insufficiency—can be relegated to a secondary position.

On this basis, too, it is very natural to suppose that toxic pregnancy may represent a defect in the production of the protective factors. The cobra hæmolytic reactions with fresh serum certainly seem to point in this direction, but, in general, evidence on the point is not as yet forthcoming. Certain experiments, indeed, of Abderhalden,[22] at first sight, appear to indicate that the prime error is in the placenta. Incubated mixtures of the following were inoculated into guinea-pigs:—

A. Serum of normal pregnancy + normal placenta.
B. Serum of normal pregnancy + eclamptic placenta.
C. Serum of eclamptic pregnancy + eclamptic placenta.
D. Serum of eclamptic pregnancy + normal placenta.

In B. and C. convulsions occurred followed by death; in A. and D. there was no result. Undoubtedly the eclamptic placenta is more toxic than the normal organ. Although the placental peptone shows no quantitative difference,[22] my own investigation[45] of the lipoids showed a much larger proportion of hæmolytically more active lipoid in the former. But there is in this no absolute evidence of a primary abnormality. It may be that the increase is comparable to that which occurs in the liver as the result of a hæmotoxic injection;[66] the placenta is almost as rich in enzymes as the liver and may suffer in a similar manner. At the same time it must be admitted that the hæmolytic activity of these lipoids scarcely tallies with the reduced iodine values of the lipoids extracted from the liver in such cases.

The interesting results detailed under the heading of Therapeutic Inoculations, while few in number, are yet suggestive that something is lacking in toxic pregnancy which can be supplied by the addition of healthy pregnant serum; but even here the *fresh* element has to be distinguished from the purely *pregnant* element.

In conclusion, one must admit that research work on the immunology of pregnancy has progressed no further than the erection of a scaffolding which, while still largely disconnected, does, at the same time, give a moderate indication of the lines of the completed edifice.

References.

1. Bar. *Leçons de pathologie obstétricale*, 2, 1907.
2. Ballantyne. *Brit. Med. Journ.*, Oct. 26 1912, p. 1123.
3. Ewing. *Amer. Journ. Med. Sci.*, vol. 139, p. 828.
4. Groat. *Amer. Journ. Obstet.*, vol. 64, No. 6, p. 952.
5. Bar and Commandeur. *L'Obstétrique*, Nov. 1911, No. 11, p. 1050.

6. Engelmann and Stade. *Zent. f. Gyn.*, 1909, Bd. 33, No 17, p. 585.
7. Dryfuss. *Biochem. Zeitsch.*, 1908, T. 7, p. 493.
8. Engelmann. *Zeitsch. f. Geb. u. Gyn.*, 1911, Bd. 68.
9. Anderson and Rosenau. *Journ. Med. Research*, vol. 19, p. 37.
10. Johnstone. *Journ. Obstet. and Gyn. Brit. Emp.*, Feb. 1911, p. 253.
11. Thies. *Zent. f. Gyn.*, 1910, No. 23.
12. Lockemann and Thies. *Cent. f. Bakt. Beilage zu Atteilunge*, Bd. 47; Refer., 1910, Oct. 4, p. 51.
13. Mosbacher. *Deutsch. med. Woch.*, June 1911, No. 22, p. 1021.
14. Fieux and Mauriac. *Compt. Rend. Soc. Biol.*, 1910, T. 68, No. 17, May 20.
15. Fieux and Mauriac. *Ann. de Gyn. et d'Obstét.*, Feb. 1910, T. 7, p. 65.
16. Chirié and Beauvy: Quoted by Bar. *Arch. mens. d'Obstét. et Gyn.*, 1912, p. 264.
17. Frankl. *Gyn. Rundsch.*, 1909, p. 111. Quoted by Bar, *loc. cit*
18. Lemaire and Laffont. *Compt. Rend. Soc. Biol.*, 1910, T. 69, Nov. 5, p. 337.
19. Bar and Daunay. *Arch. mens. d'Obstét. et Gyn.*, 1912, p. 264.
20. Schatiloff and Isabolinsky. *Zeits. f. Immunitat.*, Bd. 1, p. 339.
21. Weichardt. *Cent. f. Bakt Abt.*. 1, Refer., Bd. 42, Beiheft, 1908, p. 143.
22. Abderhalden. *Münch. med. Woch.*, 1912, No. 24, p. 1305.
23. Abderhalden. *Münch. med. Woch.*, Sept. 3 1912, p. 1939.
24. Abderhalden. "Preparation of placental peptone, etc.," J. Springer, Berlin, 1912.
25. Mayer and Linser. *Münch. med. Woch.*, Dec. 27 1910, vol. 57, No. 52, p. 2757.
26. Mayer. *Zent. f. Gyn.*, March 4, vol. 35, No. 9, p. 337.
27. Mayer. *Zent. f. Gyn.*, Sept. 16, vol. 35, No. 37, p. 1297.
28. Freund. *Med. klin. Berlin*, March 5, vol. 7, No. 10, p. 363.
29. Brieger and Trebing. *Berlin klin. Woch.*, 1908, No. 22.
30. Gräffenberg. *Zeitsch. f. Geb. u. Gyn.*, 1910, Bd. 65.
31. Heide and Krosing. *Zeitsch. f. Geb. u. Gyn.*, 1911, Bd. 67, H. 1
32. Becker. *Münch. med. Woch.*, 1909, No. 27, p. 1363
33. Rosenthal. *Zeitsch. f. klin. Med.*, vol. 72, Nos. 5-6, pp. 505—576.
34. Neumann and Hermann. *Wien klin. Woch.*, 1911, No. 14.
35. Hermann and Neumann. *Biochem. Zeitsch.*, 1912, Bd. 43, p. 47
36. Roemer. *Zeitsch. f. Geb. u. Gyn.*, 1912, Bd. 71, p. 350.
37. Gross and Bunzel. *Wien. klin. Woch.*, 1909, No. 22, p. 783.
38. Gross and Bunzel. *Wien. klin. Woch.*, 1909, No. 36.
39. Nadosy: Quoted by Semon. *Zeitsch. f. Geb. u. Gyn.*, Bd. 67, H. 3.
40. Alsberg. *Zeitsch. f. Gyn.*, 1910, No. 1. Quoted by Semon, *loc. cit.*
41. Thomsen. *Berlin klin. Woch.*, 1909, No. 46.
42. Heynemann. *Münch. med. Woch.*, 1910, No. 15.
43. Semon. *Zeitsch. f. Geb. u. Gyn.*, Bd. 67, H. 3.
44. Carl Browning and Mackenzie: Oxford Medical Publications, 1912.
45. Leith Murray. *Journ. Obstet. and Gyn. Brit. Emp.*, Oct. 1910.
46. Leith Murray. *Brit. Med. Journ.*, Jan. 28, 1911.
47. Opie. *Journ. Med. Research*, vol. 12, p. 156.
48. Wallace. *Lancet*, Dec. 7 1912, p. 1574.
49. Flexner. *Univ. Penn. Med. Bull.*, Nov. 1902.
50. Welch. *Amer. Journ. of Obstet.*, 1909, vol. 59, p. 1.
51. Pearce. *Journ. Exper. Med.*, 1906, vol. 8, p. 64.
52. Nowak. *Ann. de l'Instit. Past.*, 1898, vol. 12, p. 369.

53. Kilvington. *Journ. Physiol.*, 1902, vol. 28, p. 426.
54. Elliott. *Lancet*, 1904, vol. 1, p. 715.
55. Flexner and Noguchi. *Univ. Penn. Med. Bull.*, 1903, vol. 15, p. 345.
56. Noguchi. Osler and McCrae's *System of Medicine*, vol. 1, p. 264
57. Bauer. *Münch. med. Woch.*, 1909, No. 27.
58. Bürgers. *Zeitsch. f. Immunitat. Orig.*, 1910, Bd. 5, H. 5, p. 648.
59. Bauer and Lehndorff. *Fol. Serol.*, H. 3, 1909. Quoted by Bar and Commander, *loc. cit.*
60. Heynemann. *Arch. f. Gyn.*, 1910, T. 90, p. 237.
61. Frankl and Richter. *Gyn. Rundschau*, 1911, H. 7, p. 263 Quoted by v. Graff and v. Zubrzycki, *loc. cit.*
62. v. Graff and v. Zubrzycki. *Münch. med. Woch.*, March 12 1912, vol. 59, No. 11, p. 574.
63. Roemer. *Loc. cit.*
64. Ritz. *Zeitsch. f. Immunitat.*, April 22 1912, T. 13, p. 62.
65. Fleming. *Brit. Med. Journal*, 1909, p. 984.
66. Jackson and Pearce. *Journ. Exper. Med.*, 1907, vol. 9, pp. 520—587.
67. Halford. *Austral. Med. Gazette*, vol. 28, No. 11.
68. Bang and Overton. *Biochem. Zeitsch.*, March 8 1911, T. 31, p. 243.

I am indebted to the Honorary Medical Officers of the Liverpool Maternity Hospital for most of the material utilized in these researches, and to Dr. Stenhouse Williams for much kind assistance in his laboratory.

Teratoma of the Thyroid in a Fœtus.

By A. W. Russell, M.A., M.B.,

Obstetric Physician to the Glasgow Maternity and Women's Hospital; Surgeon to the Royal Samaritan Hospital for Women; Examiner in Midwifery, National University of Ireland,

and Alex. Mills Kennedy, M.D.,

Senior Assistant Pathologist to the Glasgow Royal Infirmary; Pathologist to the Glasgow Maternity and Women's Hospital; Assistant to the St. Mungo (Notman) Professor of Pathology, Glasgow University.

Congenital tumour of the thyroid gland, variously called congenital or intrauterine bronchocele or goitre or struma congenita, is of so rare occurrence that when it is found it is usually considered worthy of special report, and it must be one of the rarest of the fœtal causes of dystocia. In the 22 volumes of the Journal of Obstetrics and Gynæcology of the British Empire now published the only reference to it is in Hewetson's paper [1] in vol. iv, and those interested in the subject are referred to this very full and careful description of a specimen sent to him for examination with the excellent photograph and microphotographs prepared by him to show the external appearance and the minute structure.

In describing an example of this unusual condition, which seems to have some specially interesting, if not unique, pathological features, it may be helpful to make a short preliminary reference to what has already been written on the subject. Several kinds of cases need to be distinguished from the true congenital or intrauterine thyroid tumours, *e.g.*, (1) enlargements of the thymus gland, hygromata, branchial cysts, cervical spina bifida, ranula. (2) Cases of acute swelling of the thyroid region arising during difficult labour with face or other abnormal presentations. These quickly disappear after the labour is over, though death from asphyxia has been recorded (Hecker [2]). (3) Enlargement of the thyroid gland directly associated with the use of such drugs as chlorate or iodide of potassium or both together by the mother during pregnancy. In the cases reported by Sir Jas. Y. Simpson,[3] A. R. Simpson,[4] Angus MacDonald,[5] Fothergill,[6] Hewetson,[7] J. W. Simpson,[8] B. P. Watson,[9] there seems to be a direct etiological association with the use of one or other of these drugs; though Birnbaum [10] (Blacker's translation) makes light of it. (4) Exophthalmic goitre. Clifford White [11] has

recently described a very interesting case that seems both from the symptoms and from the microscopic sections made from the enlarged thyroid gland to belong without doubt to this class.

When such cases have been differentiated we have still left the rare but sufficiently characteristic congenital or intrauterine thyroid tumours. Ballantyne [12] in his classic work on Antenatal Pathology, in the volume on The Fœtus published in 1902, describes this condition, gives references to other cases reported up to date, and classifies them under three headings: (*a*) adenomatous, (*b*) parenchymatous, (*c*) vascular or congestive. Hewetson,[7] in reporting a second case, follows the same classification. Fabre and Thevenot [13] recently described five varieties—vascular tumour, simple hypertrophy, cyst-adenoma, fibroma, cystoma, but there seems to be no justification for departing from the simpler and quite sufficient classification of Ballantyne unless it be to add the type of the pure teratoma of the thyroid gland that is the occasion of the present communication.

Notes of the case. Mrs. D., iii-gravida, age 22, was admitted into the Maternity Hospital in labour on February 18 1911, and was delivered the same night. There was nothing to note either in the family or in the personal history. At her first confinement she had a child at full term, forceps being used under chloroform. The second pregnancy ended in miscarriage 16 months before the beginning of the present pregnancy. She had kept well till three weeks before admission, but she always thought she was "big for her time," especially observing rapid distension in these last three weeks. The abdomen measured 41½ inches, and there was œdema of the abdominal wall as well as the feet and legs. The digestive, respiratory and circulatory functions required no remark. Fœtus could not be palpated but movements were felt. She was taken into the labour ward at 3-30 p.m., and the diagnosis was noted as a brow presentation with hydramnios. At 5 p.m. the amniotic cavity was tapped with a catheter by the house surgeon and 14 pints were drawn off, a tight binder being then applied. After 9 p.m., as labour was not progressing and the head remained in the transverse diameter with defective flexion, one of us attended as obstetric physician on duty. In examination under an anæsthetic the swelling of the neck was discovered and delivery was then completed with the forceps. The child was a fully developed female and was dead. The weight was 6¾ lbs., and the length 20 inches. The mother was dismissed from the hospital at the end of 10 days well.

Remarks. Several important points deserve to be noted regarding this case. (1) It was associated with hydramnios, the liquor amnii measuring 14 pints. Kleinhans,[14] who writes the article on difficulties in labour due to fœtal deformity in von Winckel's Handbook, mentions a case in which there was "a colossal hydram-

External appearance of fœtus showing tumour of neck.

Tumour dissected to show relations.

nios" and the tumour was as big as a child's head, being described from its pathological characters as a papillary cysto-adeno-chondro-sarcomatous goitre. Other similar cases have been reported. (2) The presentation was abnormal—a brow, and there was consequent delay and difficulty in labour. This is as might be expected, proper flexion of the descending head being prevented by the tumour under the chin. Keiller,[15] as far back as 1855, has reported a forehead presentation in such a case. But this is not the only abnormality. Kleinhans,[14] in the article already quoted, mentions five cases in which labour, though ending spontaneously, was prolonged and difficult, and the breech presented in three of them. Stumpf is quoted by Birnbaum [10] as reporting that in 115 collected cases 72 were breech presentations—a very much larger proportion than is normal. (3) The fœtus was fully developed, mature, and a female. Such deformities have occurred more frequently in the male and the birth has usually been premature. (4) No hereditary influence could be discovered. Demme [16], in his article on disorders of the thyroid gland in Gerhardt's Handbook, gives the results of enquiry as to heredity in 53 congenital cases as 37 in both parents or in mother alone, and 16 in neither parent. (5) The most important and interesting feature of the present case is its pathological structure, which proves it to be a true teratoma of the thyroid gland. The two drawings show the external appearance and proportions of the tumour in the neck, and its relations when partially dissected, and the microphotographs illustrate its minute structure as now described.

The cervical tumour forms a lobulated swelling in front of the neck about the size of a large Jaffa orange.

It is situated beneath the deep cervical fascia and, vertically, in the middle line it extends from the symphysis menti to the suprasternal notch. Laterally the mass extends outwards on either side of the middle line but more to the right than to the left. The sterno-mastoid muscle on the left side lies flattened upon the left lateral aspect of the tumour, whereas on the right side the tumour extends further out and overlaps the right sterno-mastoid muscle. The upper margin of the tumour is bounded by the lower margin of the mandible; the lower margin of the left lobe is bounded by the clavicle whereas the right lobe overlaps the clavicle and lies at a lower level. Probably about two-thirds of the bulk of the tumour mass are situated on the right of the middle line of the neck.

The tumour has a distinct fibrous covering and can be more or less easily shelled out from all the structures of the neck except the larynx, trachea, and œsophagus. Anteriorly three principal lobes are demarcated. The smallest one is in the middle and occupies the upper third of the mass. It is situated partly in the middle line of the neck but the greater bulk of it is to the right of the middle

line. The next largest portion forms a somewhat rounded mass situated to the left of the first portion, a shallow sulcus lying between them. The third and largest portion is equal in bulk to the first two together and forms the right lobe of the tumour. It is separated from the central smallest lobe by a distinct sulcus; it forms a mass to the right of and below the central lobe and is continuous round the under surface of the latter with the left lobe.

A few small knob-like lobules are evident on the surfaces of the left and the central lobes.

Posteriorly the trachea and œsophagus run down on the surface of the tumour. The tumour is definitely seen to have its origin in the thyroid gland, and the portion corresponding to the thyroid gland is cystic, the cysts containing colloid or mucoid material. The tumour surrounds the trachea in front and on either side and is attached to it, and its attachment extends from the root of the tongue downwards to a short distance below the thyroid cartilage.

The larynx and upper portion of the trachea are distinctly displaced to the left and the œsophagus lies posterior to the trachea. The œsophagus is not compressed by the tumour. The trachea may be compressed but it is not occluded. A large lobe of tumour bulges into the right vallecula of the pharynx displacing the epiglottis and the right aryteno-epiglottic fold, and forming a rounded mass projecting over and occluding the entrance to the larynx. It causes a distinct mechanical obstruction. The carotid arteries, jugular veins, and vagus nerves lie posterior to the tumour.

On section the tumour is seen to be irregularly cystic, the cysts being found chiefly in the left and middle lobes; a large cyst is present in front of the trachea in position corresponding with that of the thyroid gland. The posterior part of this forms the swelling projecting into the pharynx described above. The cysts are well-defined and tend to be multilocular. The right lobe of the tumour forms a more or less solid mass possessing only one large cyst at its extreme right side. It is made up of a tough fibrous basis enclosing structures of a softer consistency. There are places, however, which give a gritty elastic feeling suggesting the presence of cartilage.

All the other organs of the body were normal; the lungs were unexpanded, no air whatsoever having entered them. The thymus was found normal in size but somewhat displaced over on the upper part of the left lung.

Histological examination of several portions of the thyroid tumour was made, and it is at once seen that very little thyroid tissue is present. There is an adenomatous tissue which in many places is cystic, and containing colloid material, in other places showing numerous intracystic papillomatous growths, and the whole is sup-

ported by a fibrous tissue stroma. The epithelium of this adenomatous tissue is much richer than that of ordinary thyroid tissue.

But the greater bulk of the tumour is made up of heterogeneous tissue-elements, and further examination determines the fact that structures representing all three layers of the embryo are present and that the tumour is undoubtedly a teratoma.

Stratified squamous epithelium is present covering a substratum of fibrous tissue containing many hair follicles, and no doubt this represents embryonal scalp.

Gland tubules, the epithelial lining of which has stratified squamous epithelium with the characters of epidermis of the embryo are present. Other gland tubules are present showing low columnar ciliated epithelium and containing mucus. A third group is lined with tall columnar ciliated epithelium and goblet-cells. Sweat glands can also be distinguished.

Portions of pigmented columnar epithelium are observed and probably represent embryonic retina. Bone and hyaline cartilage are seen in places, and there is one piece showing bone developing from cartilage.

Embryonic nerve tissue is present in abundance. In many places the various structures seem to be embedded in a gliomatous matrix.

Nowhere are the various elements arranged to form a definite structure, the nearest approach being at one place where a strip of cartilage is associated with a tubular layer of columnar ciliated epithelium suggesting bronchus formation.

The various elements could all be seen in one microscopic section of the tumour, and they may be classified as follows:—

(*a*) *Of Epiblastic origin.*
- Stratified squamous epithelium.
- Hair follicles.
- Sweat glands.
- Gliomatous tissue.
- Pigmented columnar epithelium. (Retina.)

(*b*) *Of Mesoblastic origin.*
- Hyaline cartilage.
- Bone.

(*c*) *Of Hypoblastic origin.*
- Columnar epithelium of tracheo-bronchial and gastro-intestinal characters.

Since all three germinal layers are represented by the tissues of the tumour it must be considered a true embryoma. According to current theory the growth has originated from some fœtal inclusion of "blastomeres" or "totipotent cells," and the inclusion being recognizable as a large tumour at birth it is evident that the included cells must have undergone development practically *pari passu* with the host.

DESCRIPTIONS OF MICRO-PHOTOGRAPHS.

Fig. 1. Piece of the tumour suggesting bronchus formation. A strip of cartilage is shown in association with a tubular layer of columnar ciliated epithelium containing mucus.

Fig. 2. Piece of the tumour resembling scalp. Stratified squamous epithelium is seen covering a substratum of fibrous tissue containing many hair follicles.

Fig. 3. Shows the embryonic nerve tissue which in many places forms a matrix for the other elements of the tumour. In the upper half of the photograph the gliomatous tissue is seen arranged round a central canal, and in the lower half a tubular gland with low columnar epithelium is shown.

Fig. 4. Piece of the tumour showing bone and sweat glands.

Fig. 5. Piece of the tumour showing cartilage, and bone developing from cartilage.

REFERENCES.

1. Hewetson (J.). *Journ. of Obstet. and Gynæc., of the Brit. Emp.*, 1903, vol. iv, p. 355.
2. Hecker. *Monats. f. Geburts.*, vol. xxxiv, p. 307.
3. Simpson (Sir Jas. Y.). *Monthly Journ. of Med. Sci.*, 1855, vol. xx, p. 350.
4. Simpson (A. R.). *Glas. Med. Journ.*, 1866-7, 3rd series, pt. 1, p. 181.
5. MacDonald (Angus). *Edin. Obstet. Trans.*, 1902-3.
6. Fothergill (W. E.). *Edin. Obstet. Trans.*, 1903-4, p. 41.
7. Hewetson (J.). *Brit. Med. Journ.*, 1903, vol. i, p. 657.
8. Simpson (J. W.). *Scottish Med. and Surg. Journ.*, 1906.
9. Watson (B. P.). *Edin. Obstet. Trans.*, 1906-7, vol. xxxii, p. 204.
10. Birnbaum (R.). (Blacker's Translation, 1912.) *Clin. Manual of the Malformations and Congenital Diseases of the Fœtus.*
11. White (Clifford). *Proc. Roy. Soc. of Med.*, 1912, vol. 5, No. 6, p. 247.
12. Ballantyne (J. W.). *Antenatal Pathology: The Fœtus*, 1902, p. 374.
13. Fabre and Thevenot. *Lyon Méd. Journ.*, Dec. 8, 1907, and *Revue de Chirurgie*, June, 1908.
14. Kleinhans. *Handbuch der Geburts.* (F. von Winckel), 1905, Bd. ii, T. 3, S. 1659.
15. Keiller. *Edin. Med. and Surg. Journ.*, 1855, vol. lxxxii, p. 31.
16. Demme. *Handbuch der Kinderkrankheiten* (Gerhardt), Bd. iii, T. 2, S. 392.

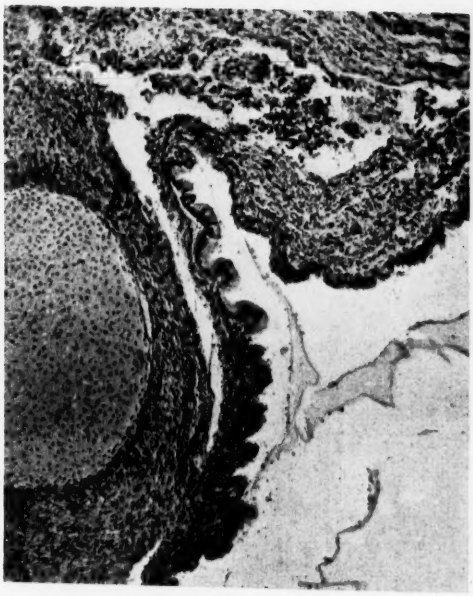


Fig. 1. ×90.

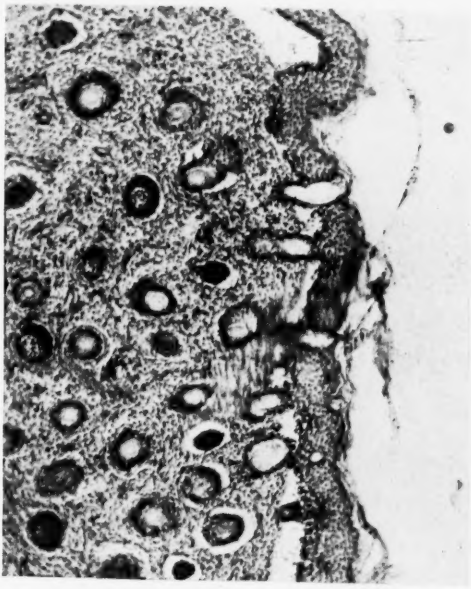


Fig. 2. ×90.

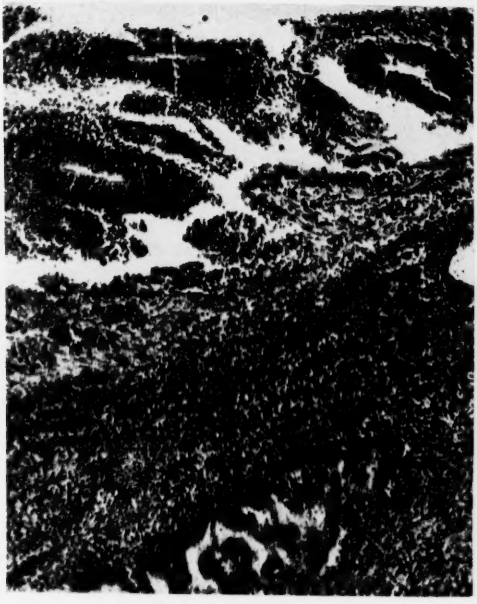


Fig. 3. ×90.

Fig. 4. ×90.

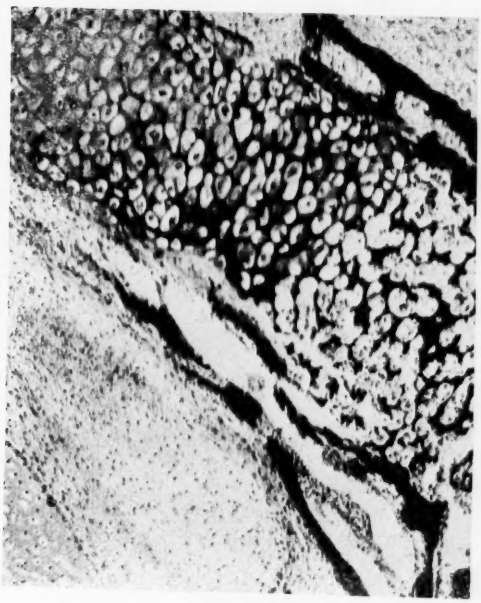


Fig. 5. ×90.

SELECT CLINICAL REPORTS.

(Under this heading are recorded, singly or in groups, cases to which a special interest attaches either from their unusual character or from being, in a special sense, typical examples of their class.)

Case of Ovarian Pregnancy with Full Time Fœtus.

By T. B. Grimsdale.

Hon. Gynæcological Surgeon, Royal Infirmary, Liverpool.

It seems desirable to place the following case on record because of its rarity. There are now a considerable number of cases of ovarian pregnancy that have appeared in the Journals from time to time but so far these have all been early cases of a few weeks' pregnancy. The case which I relate is one of ovarian pregnancy in which the fœtus grew to the full term of development in the ovary without rupturing it.

E.O., aged 22, married 3 years, came into the Royal Infirmary on February 19 1912. She was a healthy, well-nourished woman and complained of an abdominal swelling, the presence of which she says she has been aware of for about 3 years. The family history is good. No history of tumours. She has always enjoyed good health and has had no serious illness, except scarlatina when a school girl.

Menses commenced at 14 years, periods regular, lasting 3 days, no pain. She has had 3 children; the first two were stillborn. The third was born alive 2 months ago and is quite healthy.

Patient states that she first noticed the swelling in the abdomen nearly 3 years ago. She says that "she never became small" after her first child was born. She thinks she has been growing larger. She has no pain. The bowels are regular.

Patient has had some pain on micturition at times.

The patient is well nourished, the mucous membranes are well coloured. There is no cyanosis. No jaundice and no œdema.

It was noticed that at times the patient had a somewhat bluish colour.

The pulse is regular in time and force. The heart sounds are regular, the heart is not enlarged and there are no adventitious sounds.

No cough. Tongue showed slight coating. Teeth good. Appetite good.

Urine acid 1020. No albumen, pus or blood or sugar.

On examination per abdomen. A hard freely movable rounded swelling can be felt, of about the size of a melon, occupying the lower abdomen and reaching to the umbilicus. The tumour is not tender. Percussion note over tumour is dull. There is no free fluid in the peritoneum.

Per vaginam. The uterus can be made out lying to the right of the tumour and is free from it.

The diagnosis of solid ovarian tumour was made.

At the operation, February 22 1912. The abdomen was opened in the middle line. The tumour was seen to be freely movable; there was one small adhesion of the omentum to the tumour but otherwise there were no adhesions, so that the relation could be clearly demonstrated. The tumour was delivered whole through the abdominal wound and it was then seen that it occupied the position of the left ovary. The left Fallopian tube and meso-salpinx were entirely normal, the left round ligament was seen to arise from the left horn of the uterus and to lie well to the right of the tumour, proving that it was not an ill-developed left horn of the uterus.

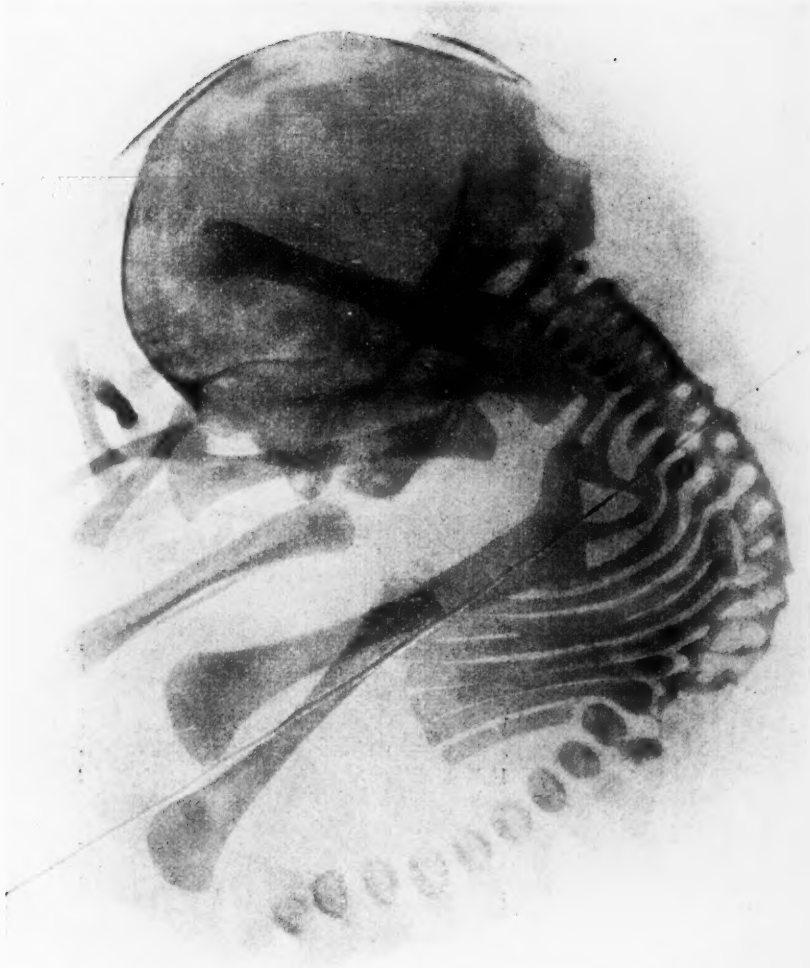
The specimen removed consisted of the left ovary with the left Fallopian tube and meso-salpinx. The measurements were:—

Length of tumour 7½ inches, breadth 6½ inches, depth 6½ inches.

The first illustration shows the external appearance of the tumour; it will be noted that the surface of the tumour is quite smooth, that its contour is quite regular and free from adhesions. The Fallopian tube is normal and the meso-salpinx is thin and is not in any way implicated. The appearance of the specimen is that of an ovarian tumour. The whitish line running round the tumour is the line of incision of the cyst wall made in order to show the contents.

On opening the tumour it was found to contain a fœtus and placenta. Fig. 2 is a photograph which shows the tumour opened by cutting off a portion of the cyst wall and removing the portion like a lid. The fœtus is lying undisturbed in its original position. The right foot, leg and thigh can be well seen as well as a portion of left knee, the head and left hand. At the right side of the picture is a dark, crescent-shaped mass which represents the placenta. Some sections were taken of the wall of the tumour covering the fœtus but it was much thinned out and it was not possible to demonstrate ovarian tissue in the wall. This to my mind is not of very great moment seeing that the possibility of ovarian pregnancy has been now fully established by early cases. It cannot be expected, in late cases such as this, that ovarian tissue will be demonstrated all over the containing sac microscopically. The

Mrou



possibility of ovarian pregnancy having been definitely recognized, the anatomical relations are now sufficient to establish whether any particular case is or is not ovarian.

The age of development of the fœtus is shown by the *x*-ray photograph, which was taken of the tumour by Dr. Thurstan Holland, the outline of the tumour is entirely lost but the bones of the fœtus and its position are well shown.

The right femur and tibia can be seen and the centre of ossification for the condyles of the femur, as well as that for the head of the tibia, can be clearly demonstrated showing that the fœtus has reached full term. It is curious that no history of amenorrhœa could be obtained apart from the amenorrhœa in relation to her uterine pregnancies. Neither was it possible to elicit any account of abdominal pain to suggest either a rupture of the sac with hæmorrhage at any time or a spurious labour.

This lack of symptoms inclines one to speculate upon the possibility of a coincident ovarian and uterine pregnancy in this case.

Needles in the Abdominal Cavity as a Complication of an Hysterectomy.

By Alfred Smith, F.R.C.S.I.,
Professor of Midwifery, National University; Gynæcologist, St. Vincent's Hospital, etc.

I wish to bring under your notice and place on record an " abdominal surprise " which I venture to suggest is in many points quite unique. On September 23 1912 I saw, in consultation with Dr. O'Reilly, of Ratoath, a private patient, whose symptoms, owing to age and unpleasant vaginal discharges, suggested malignant disease. Under ether I was able to satisfy myself that the cause of her trouble was multiple fibromata of the uterus without any evidence of malignancy.

A sub-total hysterectomy was advised, and successfully performed by me, assisted by Drs. O'Reilly and Meenan, on September 26 1912. The operation over, I proceeded to make the peritoneal toilet, and felt my finger pricked by some sharp instrument. On investigating the cause I found the point of a needle sticking through the wall of a small intestine. To prevent the possibility of leakage a purse-string suture of fine catgut was inserted so as to encircle the needle opening into the intestine, the ends being tightened together as the needle was withdrawn. I searched further, and, to my astonishment, I found more needles—some lying in the omentum away from any coil of intestine. Others were found projecting through the wall of the intestine, but covered by a smooth covering as if a diverticulum had been made from the intestinal wall. Others had perforated the intestine, but a protective omental adhesion surrounded the needle.

The appendix, which dipped into the pelvis almost to the floor, was, as you see, hypertrophied and markedly congested. On palpation a hard body could be felt. It was removed.

Dr. Harry Meade made an *x*-ray photograph of the appendix showing two needles and one pin lying parallel to each other, the heads being down. The eye of the needle is plainly to be seen, and Dr. T. T. O'Ferrall opened a window in the appendix showing the three metallic bodies *in situ*. All the needles—10 in number—are tarnished by sulphuretted hydrogen. They are extremely brittle and of the same size.

Considering the nature of the operation, some anxiety was felt as to the subsequent convalescence. Nothing untoward happened until the end of the third week. Preparations were being made for

Appendix showing two needles and one pin.

the patient to get up. On the morning of the appointed day, whilst at stool, the patient was seized with an acute pain referred to the anus. The sister in charge, on making an examination, found a needle stuck in the mucous membrane, which she promptly removed. Some days following this the patient complained of abdominal pains, aggravated by pressure over both iliac regions. Palliative measures gave little or no relief. The possibility of more needles being present was considered, and Dr. Maurice Hayes kindly skiagraphed the patient for me. Two of the plates located three needles—one on the right side evidently broken in two, another on the left side at the pelvic brim, and a third somewhere about the pubes. I re-opened the abdomen. It was felt that although the presence of needles was demonstrated, their precise position, whether in the intestine or outside it, could not be determined. My anxiety was soon allayed, as, dipping my fingers into the left iliac fossa, I found at once a needle perforating the sigmoid flexure of the colon, but well protected by omental adhesions. The broken needle which I show you, covered by its fibrous envelope, was removed from a small intestine on the right side. The third needle—that is, the one indicated lying close to the pubes—was found in the omentum.

My " bag " consisted of ten needles and one pin. In looking up references to foreign body appendicitis I find in the September number of the *Annals of Surgery* an exhaustive article by Royal Hamilton Fowler, M.D. He says sharp-pointed metallic foreign bodies represent a class by themselves. They have rarely been found even in large surgical experiences, and their occurrence represents a surgical curiosity. The common domestic pin is the most frequently encountered body of this nature found in the appendix. McBurney and Park have seen but two cases. A. O. J. Kelly found one instance in a study of 460 cases. Kelly and Hurdon but one in 1,000 cases. Bell two in 1,000 cases. Ewing, Schultze and Wood in exceptionally large pathological experience have observed no cases. Barnes, in a study of 94 cases of true foreign bodies found in the appendix, estimated that more than 52 per cent. were pins. Whilst Fowler observed one instance in his first series of 50 cases of appendicitis.

As regards the number of metallic bodies found in the appendix, McBurney found two pins lying parallel to each other, and Hirst also found two pins in an appendix which he removed.

On looking up the references to which I had access I cannot find recorded any case where three sharp-pointed metallic foreign bodies were previously found in the appendix. The presence of two needles is also interesting.

There can be no doubt, from the positions where the needles were found, that they gained an entrance to their host through the alimentary tract. Yet the patient stoutly denies that she ever had

the habit of holding needles in her mouth or of swallowing them. She admitted, however, that when a child in her nursery the nurse frequently gave her the work-basket to tidy and play with. That the needles were a long time lost is evident from their extreme brittleness, the well-organized fibrous envelope which covered the perforating needles, and the distance which some of the needles travelled into the omentum. This case goes to confirm the view that the presence of metallic foreign bodies is more apt to cause chronic than acute appendicitis.

It is remarkable that so many needles could be swallowed with such apparent impunity and that their perforation of the intestinal wall gave rise to so little disturbance, no evidence whatever of anything approaching a peritonitis being discovered, but merely tiny protective fibrous sheets, a delicate omental adhesion, covering the needles. This is the first recorded instance of three sharp-pointed metallic foreign bodies being found in the appendix.

All references were taken from Royal Hamilton Fowler's article in the *Annals of Surgery*, September 1912.

TECHNICAL MEMORANDA.

(Under this heading will be published from time to time notes on points of practical interest in regard to methods of treatment, operative and therapeutic, and on the general management of Obstetrical and Gynæcological cases in hospital and private practice.)

On the Technique of Amputation of the Vaginal Cervix.

By Victor Bonney, M.S., M.D., B.Sc. (Lond.), F.R.C.S., M.R.C.P.,

Assistant Gynæcological Surgeon to the Middlesex Hospital; Surgeon to the Chelsea Hospital for Women, etc.

The chief difficulty in amputation of the vaginal cervix is to approximate satisfactorily the mucous membrane covering the vaginal surface to that lining the canal.

The difficulty arises first because of the great difference in the circumference of the edges to be brought into apposition, and secondly because sutures passed through the cut edges of the cervical canal are difficult to insert and when inserted are very prone to cut out.

Schroeder's technique, which is that commonly adopted, and in which two wedges of tissue are excised from the anterior and posterior lips respectively, is faulty because it leaves behind a considerable area of the "erosion" so commonly present in these cases.

For some years I have carried out a procedure which enables the surgeon to attach the mucous membrane of the vaginal surface to that of the cervical canal both accurately and strongly.

The method is as follows:—

Step 1. The cervix is amputated by antero-posterior flaps, as indicated in fig. 1. These flaps at first consist of mucous membrane only, but towards their base include the tissue of the cervix.

Step 2. A chromicised or tanned catgut suture is inserted through the apex of the anterior flap and tied there so that the two free ends are of equal length.

Step 3. The needle still attached to one end is now inserted just within the margin of the cervical canal and passed *through the whole thickness of the cervix* to emerge in front just below the reflection of the bladder. (Fig. 2.)

The other free end of the suture is now threaded onto the needle which is passed similarly but somewhat to one side of the first track.

Step 4. Traction on the two ends of the suture is now made with the result that the flap rolls over until its apex approximates to the anterior margin of the cervical canal. (Fig. 3.) When this result is attained the two ends of the suture are tied together so as to fix the flap in this position.

Step 5. A similar method of suture is now applied to the posterior flap which is rolled in and approximated to the posterior margin of the cervical canal. (Fig. 4.)

Step 6. There now remains a gap on either side of the situation of the new *os externum.* This is closed by interrupted catgut sutures passed deeply through the cut edges of the mucous membrane and the cervical tissue underlying it. (Fig. 5.)

The method is very quickly and easily performed. The only possible accident would be the passage of the needle into the bladder when inserting the anterior approximating suture. This should not happen. Where the cervical tissues are very tough a strong needle is required. Figure 6 shows diagrammatically the principal of the approximating sutures.

DESCRIPTIONS OF FIGURES.

Fig. 1. The line of the incisions for the flaps.

Fig. 2. Passing the anterior approximating suture.

Fig. 3. Traction on the ends of the anterior approximating suture enfolds the anterior flap.

Fig. 4. Traction on the ends of the posterior approximating suture enfolds the posterior flap. The anterior approximating suture is tied.

Fig. 5. The lateral sutures.

Fig. 6. The principal of the approximating sutures shown diagrammatically.

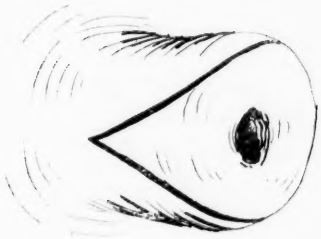


Fig. I.

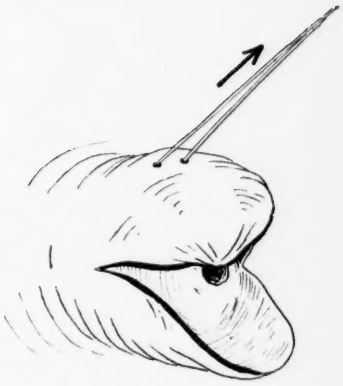


Fig. III.

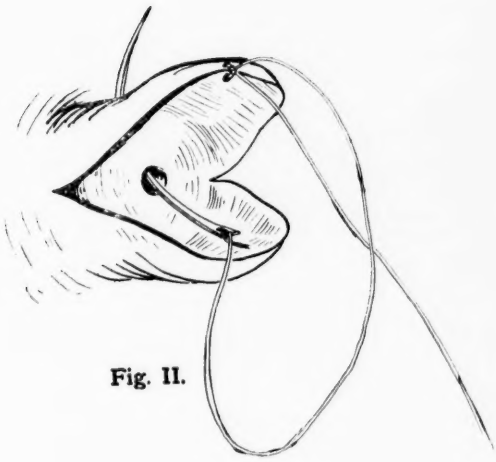


Fig. II.

Fig. IV.

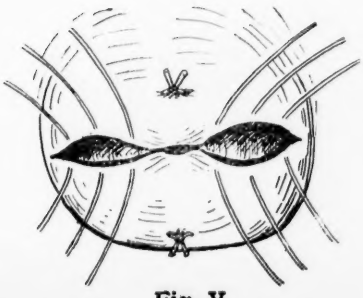


Fig. V.

Fig. VI.

REVIEWS OF CURRENT LITERATURE.

UNDER CHARGE OF EARDLEY HOLLAND, M.D.

LIST OF COLLABORATORS:

LONDON. Alban Doran, F.R.C.S.; S. Jervois Aarons, M.D.; J. Barris, M.B.; F. E. Taylor, M.D.; C. White, M.D.; J. A. Willett, M.D.; J. Wyatt, F.R.C.S.
EDINBURGH. Miss J. H. Filshill; R. W. Johnstone, M.D.; James Young, M.D.
GLASGOW. E. H. L. Oliphant, M.D.
ABERDEEN. W. R. Pirie, M.B.
MANCHESTER. J. S. Young, M.D.; J. Chisholm, M.D.
BIRMINGHAM. H. B. Whitehouse, M.S.
LIVERPOOL. H. Leith Murray, M.D.
SHEFFIELD. W. W. King, M.B.
DUNDEE. J. A. C. Kynoch, M.B.
CHELTENHAM. C. J. N. Longridge, M.D.

The maternal and fœtal blood in a case of pernicious anæmia of pregnancy.

SPIRE and PERRIN (*Bulletin de la Societé d'Obstétrique et de Gynécologie de Paris, etc.*, No. 8, Nov. 1912), in recording a case of pernicious anæmia of pregnancy occurring in a primipara, aged 22, during the eighth month of pregnancy and terminating fatally a few hours after a spontaneous labour, give a detailed account of an investigation of the maternal and fœtal blood.

The maternal blood was extremely pale in colour with a yellowish tint. It flowed freely from the puncture and coagulated in 21 minutes. The hæmoglobin registered 40 per cent.

Total leucocytes: 3800.	Per cent.
Lymphocytes	12
Large mononuclears	0·5
Polynuclear neutrophils	75·5
Eosinophils	2
Mast. Cells	1·
Myelocytes (*a*) Neutrophils	4·5
(*b*) Eosinophils	1
Transition forms	1·5
Degenerated leucocytes	2

Red cells numbered 218,000.

Films fixed immediately, gave the following percentage of forms noted.

Red cells (without nuclei)	Normal in size	25 %
	Macrocytes	16 %
	Microcytes	17·5 %
Red cells (nucleated)	Monoblasts	2 %
	Megaloblasts	1 %
Red cells (atypical)	Vacuolated	26·5 %
	Anucleated or Battledore (Poikilocytes)	10 %
Proportion of leucocytes to red cells		1 / 57·7

A considerable degree of disintegration of the red cells was present and the serum was coloured by hæmoglobin.

The fœtal blood collected from a loop of the umbilical cord between two ligatures was normal in colour and the clot was of the same characters as under ordinary conditions. The proportion of leucocytes to red cells was $\frac{1}{104}$ and a differential count gave the following result, in percentages :

	Per cent.
Lymphocytes	11·5
Mononuclears (medium)	2·5
Polymorphonuclears	74
Eosinophils	·5
Myelocytes (neutrophils)	7
Transition forms	4·5

Red cells. Without nuclei	Normal	88
	Macrocytes	3
	Microcytes	2·5
Nucleated	Monoblasts	3
	Megaloblasts	2
	Microblasts	·5
	Deformed	·5
	Vacuolated	·5

The difference between the maternal and fœtal blood is extreme, both to the naked eye and on investigation. Although not absolutely normal, the fœtal blood differs but slightly from that found in health. The maternal blood on the other hand has the characters of pernicious anæmia. It is thus evident that the causative factor, be that what it may, has been unable to traverse the placenta and exert its influence upon the hæmatopoietic organs of the fœtus. The fœtal death is due in all probability to lack of assimilation of the products of metabolism in the maternal blood, through changes established in its own blood.

The authors draw attention to the fact that pernicious anæmia occurring during pregnancy does not differ either clinically or hæmatologically from

the other etiological types of the same disease. Pregnancy should not be considered as the exciting cause but only as an important adjuvant. As shown by Perrin, pregnancy normally produces a diminution of red cells and hæmoglobin and a constant hyper-leucocytosis. This alteration in the equilibrium of the blood will thus allow unknown pathological agents to exert their baneful influence.

The paper contains full references to the literature on the subject.

H.B.W.

Pernicious anæmia and pregnancy.

VORON and GEREST (*Bulletin de la Société d'Obstétrique et de Gynécologie de Paris, etc.*, No. 8, Nov. 1912) record an extreme case of pernicious anæmia in association with pregnancy occurring in a 3-para, aged 31. During the third pregnancy, two years previously, similar symptoms had prevailed, but to a much less degree. The patient was admitted to hospital during the 5th month of the present pregnancy, complaining of intense lassitude, headache and vertigo. The degree of anæmia was extreme and the blood presented the following characters.

Red cells	770,000
Leucocytes	5,970
Polymorphonuclears	75 %
Lymphocytes	21 %
Large mononuclears	4 %
Eosinophils	0

Poikilocytosis was marked but no giant cells, nucleated red cells or free nuclei were observed. No cause for the anæmia was found. It certainly could not be described as 'secondary' as no blood was lost from any of the mucous membranes and none was present in the fæces. There was a total absence of all digestive troubles. The appetite was good and the vomiting during the early months of pregnancy of slight importance only. The pathology of the condition was quite obscure, the only definite fact being the development and progression of the anæmia pari passu with the pregnancy. Premature labour occurred, the child weighing 1100 grammes and dying 8 hours after delivery. The chorion was thickened and adherent and it was necessary to remove it by hand. Recovery from the anæmia was instituted almost immediately and one month after delivery the result of examination of the blood was as follows :

Red cells	2,824,000
Leucocytes	14,000

Absence of normoblasts, megaloblasts and myelocytes.

The authors note the early incidence of the disease, the more usual period being about the 7th month of pregnancy. They also draw attention to the marked leucopenia, the absence of a lymphocytosis and the non-existence of any form of regeneration on the part of the red cells : points all in favour of a very severe degree of anæmia and serious prognosis. In spite of these facts however, the patient recovered as soon as the pregnancy terminated.

H.B.W.

Pernicious anæmia of pregnancy.

PLAUCHU (*Bulletin de la Société d'Obstétrique et de Gynécologie de Paris, etc.*, No. 8, Nov. 1912) gives full details of a case of pernicious anæmia in a 3-para, aged 29, which terminated fatally five days after the induction of labour at the $7\frac{1}{2}$ month of pregnancy. When admitted to the Maternité de la Croix-Rousse the degree of anæmia was extreme. The lips were absolutely white and were hardly distinguishable from the face which had a distinctly greenish tint. Dyspnœa was marked. Examination of the blood gave the following figures:

Red cells	1,023,000
Leucocytes	10,000

The serum showed an absence of autolysin but after heating at a temperature of 56° C. for half an hour traces of isolysin were found.

No condition apart from the pregnancy was found to account for the severe degree of anæmia.

The fœtus was stillborn and less developed than had been expected from the period of pregnancy. The placenta was completely decolourised and presented an extraordinary degree of friability.

Plauchu asks if the failure of treatment in this case may be regarded as establishing a contra-indication to the interruption of pregnancy in this condition. Induction of labour for pernicious anæmia of pregnancy has met with both success and non-success. It is only recently that complete hæmatological investigations have been made, such as are recorded in the work of Garipuy and Claude, Audebert and Daloux, Boissard and Verdoux and Bourret. Possibly in the future the absence or paucity of signs of regeneration on the part of the elements in the blood may be of value in the indication or contra-indication of induction. A study of the autolysins and hetero-lysins of the serum such as has been carried out by Dufour will also undoubtedly lead to important results.

The author classifies the recorded cases of pernicious anæmia and pregnancy under three groups, viz.:

(1) Cases in which labour, spontaneous or induced, has not prevented the fatal termination.
(2) Cases in which maternal death occurs before labour takes place.
(3) Cases of maternal recovery after labour, spontaneous or induced.

Plauchu includes summaries and references to seven cases in group (1), three cases in group (2) and five cases under group (3). He draws attention to the very high mortality both maternal and fœtal, but thinks that in spite of several failures induction of labour is quite legitimate. Medicinal measures are of little avail and sufficient cases are recorded to show that in some at least, amelioration of the symptoms may be effected by this means.

H.B.W.

The viscosity of the blood during pregnancy and the puerperium and its bearing on arterial tension.

PELLISSIER (*Bulletin de la Société d'Obstétrique et de Gynécologie de Paris, etc.*, No. 8, Nov. 1912) has studied at the Clinique Tarnier the viscosity of the blood during pregnancy, labour and the puerperium in the

case of 27 normal patients, 3 tubercular ditto, 13 women exhibiting albuminuria and one example of eclampsia. His conclusions are as follows :

(1) Under normal conditions, pregnancy and parturition influence but slightly the viscosity and arterial tension. During the last month of pregnancy the viscosity is slightly lowered and the curve of tension becomes irregular.

(2) In the case of patients with albuminuria, the lowering of the viscosity coinciding with elevation of arterial tension is an index of renal obstruction.

(3) In tubercular patients, a low arterial tension with progressive increase of the viscosity of the blood indicates a grave condition of the disease.

It appears therefore that these investigations when conducted in conjunction are of importance

(1) In investigating the function of the kidneys during pregnancy.

(2) To estimate the prognosis in some forms of pulmonary tuberculosis.

H.B.W.

The treatment of uterine fibromyomata by x-rays and radium.

Siredey, Chéron and Boissard (*Bulletin de la Société d'Obstétrique et de Gynécologie de Paris, etc.*, No. 8, Nov. 1912) in a discussion upon the above subject before the Obstetrical Society of Paris, record the results of their experience.

Siredey has employed radiotherapy in 59 cases without accident, 40 of these being cases of fibromyomata of the uterus. The remaining 19 consisted of cases of fibrosis uteri of a diffuse type without tumour formation, but associated with profuse hæmorrhage. For this condition Sireday thinks that the application of *x*-rays should be the method of choice. Fifteen of his patients were cured without recourse to other treatment. In 2 the hæmorrhage recurred after amenorrhœa of seven and five months respectively. One patient was discouraged at the continuation of the bleeding after eight applications and submitted to sub-total hysterectomy, and another is still under treatment. Amongst 40 cases of fibromyomata, 35 have shown undoubted improvement with radiotherapy. The word 'cure' cannot be employed inasmuch as the tumours do not entirely disappear, although they all show more or less reduction in size. The most important effects noted, were absolute cessation of the hæmorrhage, discharge, pain and symptoms due to compression. The patients were all able more or less to follow their usual occupation and Siredey regards the cure as analogous to that sometimes occurring after the menopause. *X*-rays, however, produce more than simple castration. They appear to act directly upon the tissues of the neoplasm, differing in degree according to the case. Thickness of the abdominal wall, depth of the tumour from the surface and perhaps certain details in the structure of the neoplasms, which as yet are insufficiently understood, are factors which influence the results of this method of treatment. Others not less important are the quality of the apparatus used, the intensity of the radiations and the skill of the operator. Siredey's observations agree with those of Belot in that a large fibromyoma has never been seen to disappear under radiotherapy, although the diminution in size is sometimes remarkable. The author therefore recommends surgical intervention in the case of very large and multilobular neoplasms or those that are growing rapidly and especially if situated in the lower uterine segment

or cervix. Operation should also be practised if metrorrhagia continues in spite of treatment, or in cases of fibromyomata complicated by other lesions, *e.g.*, ovarian cystomata, or salpingo-oöphoritis. Radiotherapy is most efficacious about the age of 45 and the best results are obtained in the treatment of profuse and continued hæmorrhages at the time of the menopause. Before the age of 35 surgical methods are to be preferred, and the author considers that *x*-ray treatment is also contra-indicated after the menopause, because so many cases of bleeding at this period are due to carcinoma corporis uteri and senile endometritis.

Chéron, continuing the discussion, observed that many advocates of *x*-rays considered that it was the method of choice in dealing with the majority of fibroids and that there were no contra-indications, the treatment replacing all other forms of surgical or medical therapy. For his part he did not consider that it merited such an important place. The technique is far from being perfect for it still exposes the patient to risks which frequently are very serious. On the other hand, a large number of failures have been recorded. After a prolonged study of the action of different radiations upon uterine fibromyomata he had come to the conclusion that radium therapy had a future scarcely less important than *x*-rays. It is necessary to remember that the emanations of radium and *x*-rays are distinct entities both physically and biologically; and results may be obtained with the one that are absolutely impossible with the other.

Chéron tabulates reasons as follows for preferring radium to *x*-ray therapy :

(1) The physical properties of the radiations are such as to render them innocuous to parts outside the fibromatous area.
(2) The advantage gained in applying the rays directly to the part affected and in a weakened condition only to tissues beyond.
(3) It is possible to obtain diminution in the menorrhagia associated with fibroids, without having recourse to the production of an artificial menopause, a method therefore which is particularly useful in the case of young women.
(4) The advantage of being able to continue treatment in the case of patients not cured by the first applications, without the risk of initiating dermatitis or other accidents.
(5) The internal secretion of the ovary is conserved insomuch as radium emanations have no atrophic action upon the ovarian tissues.
(6) The treatment is short, being five days at the maximum. *X*-ray therapy, on the other hand, is usually protracted over months.
(7) In conjunction with *x*-rays, radium emanations will frequently effect a cure in the case of a uterus that has resisted either agent individually, as has been shown recently by the author in conjunction with Bouchacourt.

To secure the best possible results, it is necessary to know the exact biological action of each variety of radiation and furthermore to study them singly and in combination.

Boissard fully agreed with the conclusions formulated by Siredey and stated that he believed in the future that, surgical intervention for uterine fibroids would become the exception. He gave details of two cases treated by *x*-rays to show the remarkable results that can be attained by radiotherapy. H.B.W.